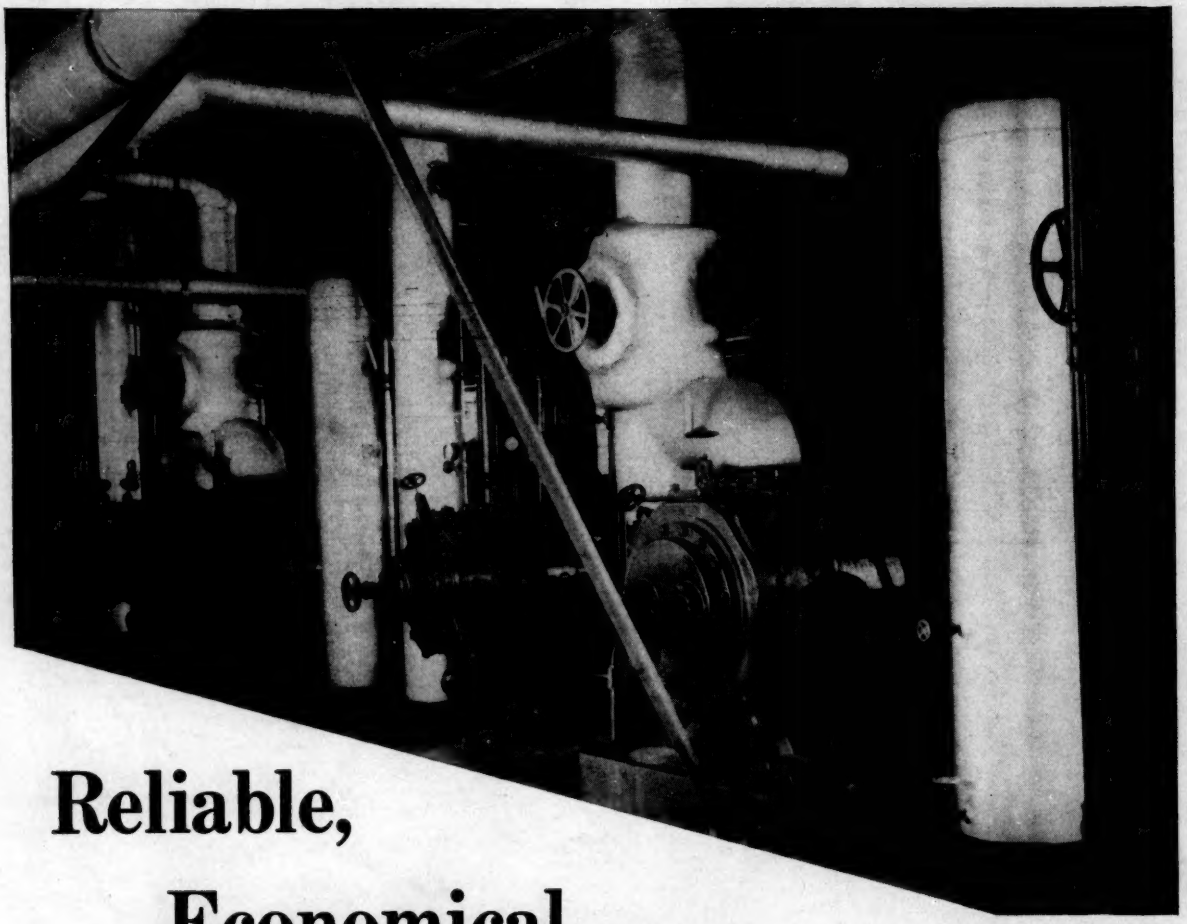
INDUSTRIAL REFRIGERATION



Reliable, Economical...

lubricated with Texaco Capella Oil Waxfree

Reliable operation is a must; maintenance costs must be kept down. You'll find *Texaco Capella Oil Waxfree* keeps refrigeration compressors running more smoothly, longer and at top efficiency.

Texaco Capella Oil Waxfree doesn't wax out in systems, even when the temperature drops as low as minus 100 degrees F. Its haze and floc temperatures are exceptionally low. Outstanding for its stability, *Texaco Capella Oil Waxfree* also is designed for high resistance to oxidation. In addition, it does not foam and it is compatible with all refrigerants.

There is a complete line of *Texaco Capella Oils Waxfree* to meet the specifications of all leading compressor manufacturers. It is available in 55-gallon and 5-gallon drums, 1-gallon cans; and the more popular grades can be bought in 1-quart containers. All are refinery sealed to protect the Texaco quality and purity.

Your Texaco Lubrication Engineer can help you select the proper lubricant for your system. Just 'phone the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, New York.

TEXACO REG. T.M.

TEXACO Capella Oils Waxfree

FOR ALL REFRIGERATING AND AIR CONDITIONING COMPRESSORS

First with the

SPECIALIZED COLD STORAGE DOORS THAT INVITE COMPARISONS

•

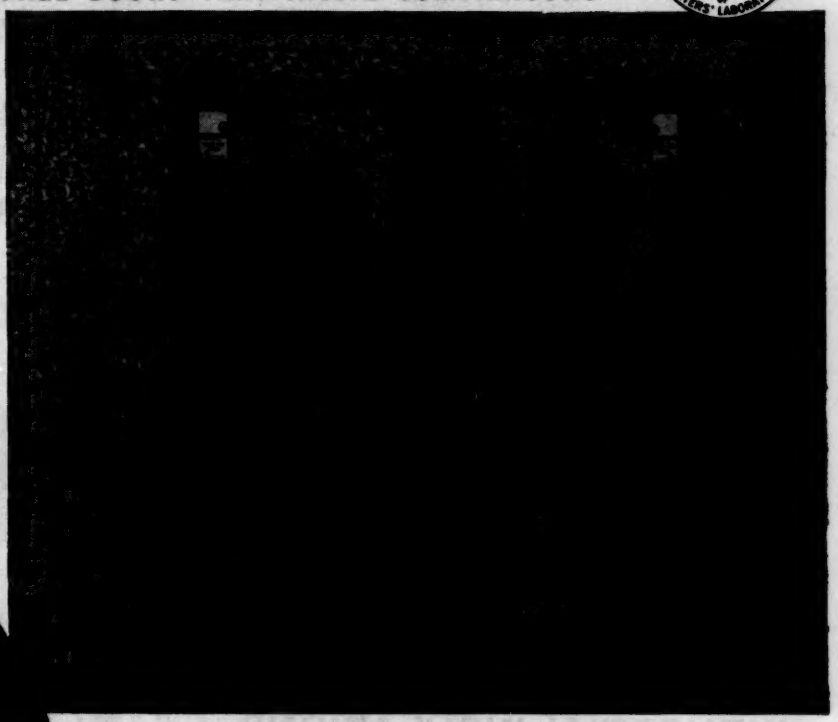
"SUPER CAM" NO. 34 ADJUSTABLE GRAVITY TYPE CLOSING HARDWARE.

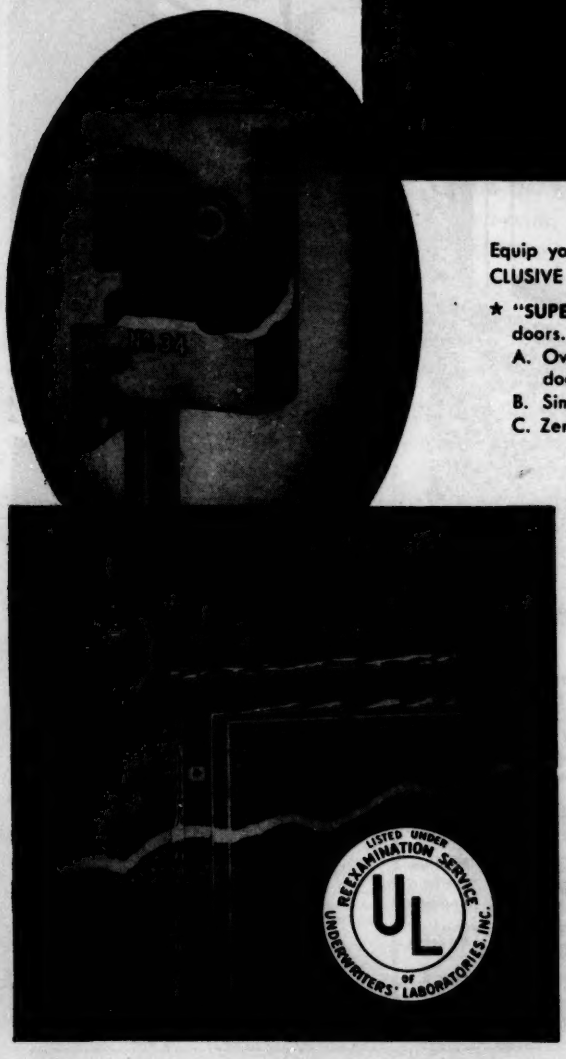
•

NO. 51 AUTOMATIC ELECTRIC DEFROSTERS WITH CALIBRATED THERMOSTAT CONTROL.

•

BUTCHER BOY "RUGGED" DOOR CONSTRUCTION FEATURING "X-TYPE" STEEL DIAGONAL BRACING FOR MAXIMUM STRENGTH AND MAXIMUM INSULATION.





Equip your Low Temperature Vestibule Freezer Doors with the following EXCLUSIVE FEATURES:

★ **"SUPER CAM NO. 34** adjustable gravity closing hardware on auto close doors.

A. Oversized roller and bearing surface combinations carry heavy armored doors with relative ease.
B. Simple adjustment and alignment provisions.
C. Zerk lubrication fittings.

★ **NO. 51 AUTOMATIC ELECTRIC DEFROSTERS WITH CALIBRATED THERMOSTAT CONTROL.**

A. Flexible "silicon" covered (not lead covered) heater cables, placed into fireproof metal channels, removable cover plates.
B. Calibrated "Thermostat", adjustment range 60° to 250° F. for economical heat control.
C. Thermostat has "pilot light" as constant guide for "on current" operation—Safety and security insurance.

★ **X-TYPE STEEL DIAGONAL BRACING**—Inner door construction.

A. Basic principle of rigidity.
B. Guarantees maximum insulation fill inside of door.
C Prevents door sagging, allows reversal of door swings.

SPECIFY BUTCHER BOY DOORS . . . ELIMINATE THE "HEADACHES" FOR THE PLANT ENGINEER.

Butcher Boy

QUALITY SINCE 1885

HARVARD, ILL.

Low-cost insulations for cold room walls and ceilings go up quickly, easily

It's easy to keep cold room construction costs in line with low-cost Armstrong Armaglas* PF Insulation. A semi-rigid batt-type material, Armaglas is applied quickly and easily against a warm side vapor barrier and in a framework of wood studs. Still air trapped by a maze of glass fibers gives this insulation high thermal efficiency. Armaglas PF Insulation will not decay or rot, is completely sanitary. It comes in 24″ x 48″ batts, up to 4″ in thickness, in 3¼ lb. per cubic foot density.

Armaglas PF Insulation is one of the three quality cold room insulations in the Armstrong line. A complete contracting service, geared to install these materials efficiently and economically, is also available.

For full data on Armaglas PF or any other Armstrong cold room insulations, send for free literature. Check the coupon below.

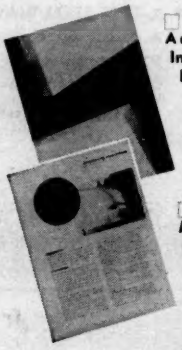
Armstrong

INDUSTRIAL INSULATIONS

for temperatures from −300° F. to +3000° F.

☐ Armstrong Armaglas Insulations for Low-Temperature Rooms

☐ Armstrong Corkboard for Low-Temperature Rooms



☐ Armstrong Armalite** Insulation for Low-Temperature Rooms

☐ Armstrong Monoplast® (data sheet on cold room finish)

**TRADE-MARK

Armstrong Cork Company
2005 Skye Drive
Lancaster, Penna.

Please send me the free booklets checked. ☐

Please have an Armstrong representative call. ☐

Name .....

Position .....

Company .....

Address .....

City ..... Zone .... State .....

*T.M. ARMSTRONG CORK CO. MANUFACTURED BY OWENS-CORNING FIBERGLAS CORP.

Industrial Refrigeration

May 1957

Now in its 66th Year of Publication

Number 5

Vol. 132

J. F. NICKERSON, FOUNDER

INDUSTRIAL REFRIGERATION, Vol. 132. No. 5 Published monthly at 433 N. Waller Ave., Chicago, Ill., U.S.A., by Nickerson & Collins Co. Yearly subscription in the U.S., $2.00 per year; other countries, $3.00. Single copies, 25 cents. Copyright 1957 by Nickerson & Collins Co. Acceptance as controlled circulation publication at Chicago, Ill., and Mendota, Ill.

H. T. McDERMOTT
Editor and Publisher

E. R. CURRY
Managing Editor

J. R. KELAHAN
Technical Editor

H. D. BUSBY
Associate Editor

ADVERTISING
O. RHODIUS ELOFSON, Director

EDW. DAVIESON, Representative

HELEN B. SMITH
Secretary

E. P. SWANSON
Subscription

V. S. SMITH
Production

Official Organ
NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

The entire contents of this journal are covered by general copyright, and special permission must be obtained from the publishers of same before reprinting long extracts of reproducing illustrations; but editors desiring to do so are welcome to use not more than one-third of an article, providing credit is given.

CHANGE OF ADDRESS—Notify publisher and your local post office promptly of change of mailing address to avoid non-receipt of copies. Copies incorrectly addressed, because of failure to notify publisher, cannot be replaced. Upon request, post office will provide, without cost, convenient "change of address" mailing cards.

Industrial Refrigeration is indexed regularly by Engineering Index, Inc., and is microfilmed for library use by University Microfilms.

Contents

Modern Warehouse in St. Louis Designed for Speedier Handling of Merchandise 13
F D A Inspections of Public Refrigerated Warehouses 18
Better Selling and Profit Planning Theme of Annual Warehouse Conventions 19
Technical Progress Reports at Annual Meeting of The Refrigeration Research Foundation 25
Advisory Group on Refrigerated and Frozen Foods Urges Expanded Research 30
Warehouse Plans to Add New Frozen Space 30
Production Started on New Ice Industry Film 59
National Association Practical Refrigerating Engineers 34
From the President's Desk 34
Prevention of Refrigerating Plant Failures 35
NAPRE Question Box 44
News Notes and Chapter Activities 46

Departments

What's New in Equipment ... 4
Press Briefs 8
In the Spotlight 11
Coming Conventions 57
News of People 59
Deaths 60
Manufacturers News 60
Catalogs and Bulletins 62

Published Monthly by NICKERSON & COLLINS CO.
General Offices: 433 N. Waller Ave., Chicago 44, Ill. Telephones: AUstin 7-1303-04-05

The Cover:

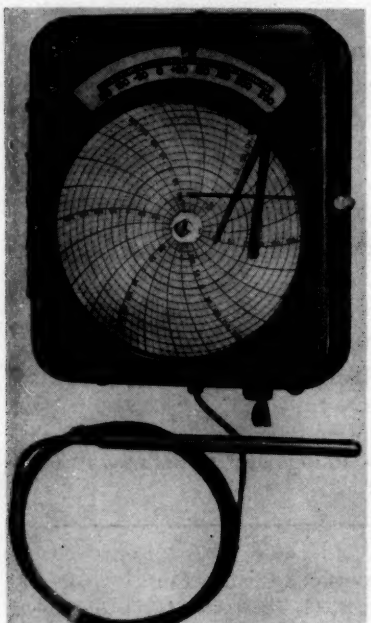
This engine room of Merchants Refrigerating Company's new Vinita Park warehouse, has a compact arrangement of compressors and liquid vessels with central control panel, at right. The two high-stage compressors in the center can also be used as boosters or on single-stage service. The equipment, automatically controlled by an electronic alarm and shutdown system for unattended overnight or week-end operation provides 380 tons of refrigeration at minus 20 F evaporating temperature for freezer storage rooms and 66 tons of blast freezer refrigeration at minus 40 F evaporating temperature. **See story starting on page 13.**

What's New

MACHINERY
APPLIANCES • PROCESSES

New Indicating Scale For Easy Reading

A LARGE indicating scale and pointer have been incorporated into the Standard Dickson "Minicorder" to provide easy reading of temperature or pressure from a distance. These new Recording Indicating instruments are known as "Minicorder." The indicator scale is mounted above the recording chart, and to provide even greater ease in reading, the single door is designed with separate viewing windows. A fluorescent pointer indicates the temperature or pressure that is being recorded on the chart below. In many instrument applications a clearly legible indication seen from a distance will save operators valuable time by making it unnecessary to step close to the recorder to read current pressure or temperature. This new instrument provides a clear indication, together with the chart of constantly varying conditions.

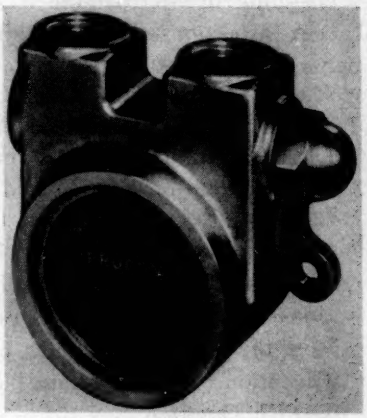


New Dickson Minicorder featuring large indicating scale and pointer.

Minicorder pointers and their recording pens are always in perfect synchronization as only one measuring element is used. The pointer and pen arm is mechanically linked to this element. Units may be supplied for most chart ranges now available for the Minicorder, design 1 and design 2. These include some 100 different chart ranges for either design. Temperature ranges are available from as low as minus 200 degrees Fahrenheit to as high as 1,000 degrees Fahrenheit, with pressure units available to as high as 2,000 psig.

New Vane Type Pumps

A NEW line of Vane-Type, positive displacement pumps with capacities of 35 to 275 gallons per hour, and pressures up to 300 lbs. per sq. in. suction lift 28 inches of mercury has been introduced by The Procon Pump & Engineering Co. Oak Park, Mich. The pumps are suitable for corrosive liquids, and for fluids at 375 F., and especially adapted for water, fuel oil, hydraulic oil, gasoline, detergents, insecticides, and many chemicals, including ammonia.



New Vane-Type pump made by Procon Pump & Engineering Company.

They are made of bronze and carbon graphite, stainless steel and carbon graphite, and aluminum and carbon graphite. The absence of metal to metal contact makes the pumps quiet, and non-pulsating resulting in extremely long operating life. They are equipped with a built-in adjustable relief valve. The unique design results in low maintenance and efficient operation.

New Continuous Hardener

A NEW continuous hardener designed for quick freezing gallon cartons of ice cream or packaged food products has been announced by Freezing Equipment Sales, Inc., York, Pa. Key features of the unit include automatic loading and unloading, refrigerating by high velocity blast of air directed across the packages, operation only on demand and minimum space requirements. The design incorporates package carriers that are pushed through a cold tunnel by a hydraulic ram. No chains, sprockets or idlers are used within the low temperature air stream,, which eliminates a potential maintenance problem.

The new hardener, which has a capacity up to 1600 gallons per hour, offers a new loading system as its outstanding improvement. The system incorporates conveyor loading, eliminates the use of a loading ram; thus obviates the possibility of crushing packages of unfrozen products entering the freezer.

Principal components of the new FES hardener include channel compartments or shelves for holding cartons, carriers made up of several compartments arranged in single vertical rows, two tiers of carrier stacks, a cold tunnel which houses the tiers, the loading conveyor assembly and hydraulic mechanisms for raising, lowering an l advancing carriers through the tunnel.

Unfrozen packages are fed into the first compartment of a carrier by a chain conveyor. When loaded, the carrier indexes vertically. The next compartment then comes into loading position with conveyors. The operation is repeated until all compartments are loaded. The carrier is then in a raised position. It now moves horizontally through the cold tunnel, the entire tier of carriers being pushed by a powerful hydraulic ram. When the carrier reaches the end of the upper tier, a hydraulic elevator lowers the carrier to the down position. The carrier now moves horizontally in the opposite direction, returning to its original position. A hydraulic ram then pushes the frozen packages from the top compartment of the carrier onto a belt conveyor.

New Fabric Batting

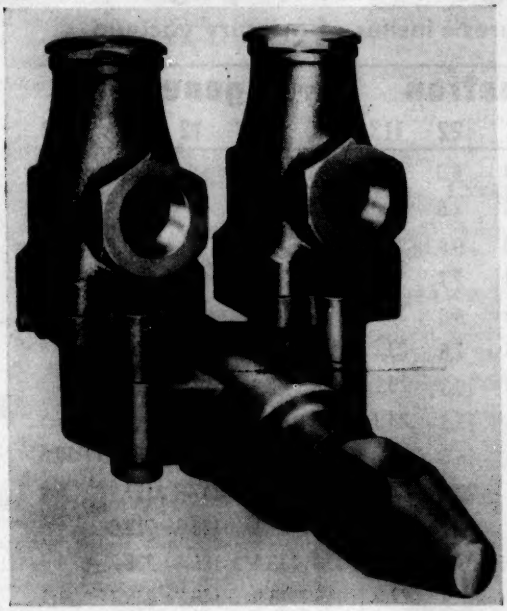
A NEW type of self-supporting batting called Ny-Sul-Loft made of nylon fibers has been introduced by the Star Woolen Co., Cohoes, N. Y. The material has characteristics useful for thermal insulation, liquid and gaseous filtration, padding, and packing applications.

As a thermal insulating agent, the material already is being used in the field of guided missiles. As a filtering medium, different degrees of separation can be achieved by using different denier fibers in the fabric or by using blends of deniers. As a vibration absorber, tests show that a ¼-inch thick piece of the new material will absorb virtually all of the vibrations induced into a table while unmounted objects produce severe surface and lateral motion. As a shock absorber, the material seems to have desirable advantages because of its ability to soften an impact while recovering to its normal shape without undue force. As a padding medium, the material is desirable because of its lightweight and permanent resilience. As a packing agent, the new product appears superior to presently used material because of nylon's inherent characteristics.

The fabric batting possesses all of nylon's properties including being antifungus, anti-mildew, rapid drying, and resistant to alkalies and most acids. Since it will withstand continuous temperatures of 300 F., it can be laminated or stitched by a process utilizing heat treatment. Originally the material was developed for use as an interlining in clothing. It has all of the desirable characteristics for such service, many of which are useful in industrial applications. It is non-allergic, light in weight, dimensionally stable under extreme conditions of cold and of heat up to the melting point of nylon itself.

New Line of Safety Relief Valves

A NEW LINE of safety relief valves designed and constructed in accordance with requirements of the latest A.S.M.E. and A.S.A. B-9 codes for use on all types of industrial refrigerating and air conditioning installations has been announced by the York Corporation, subsidiary of Borg-Warner.



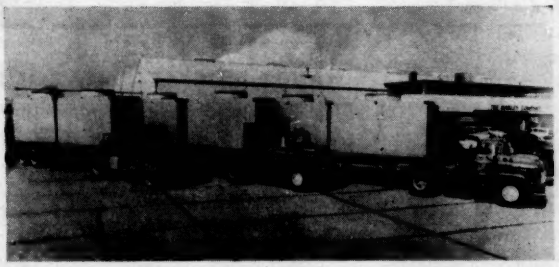
The New York Safety Relief Valve for all types of industrial refrigeration

The new line of valves is available in standard pressure settings ranging from 50 psi to 300 psi in 25-pound increments. Capacities of all sizes have been certified by the National Board of Boiler and Pressure Vessel inspectors. The York line thus meets all nationally recognized code requirements for standards of design, construction and capacity.

These valves are suitable for use with all popular refrigerants and are available in dual assemblies.

Packaged Double-Flow Aquatowers

A REDESIGNED line of Packaged Double-Flow Aquatowers has been released by The Marley Company, Kansas City, Mo. These all-new models with capacities rated nominally for 80, 100 and 125 tons now have internally mounted motors, more efficient drift eliminators and a rugged combination mechanical equipment support and water distribution piping assembly.

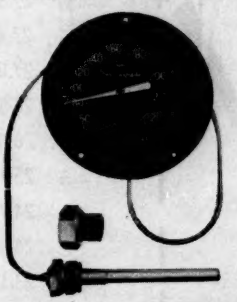


Six 100-ton Marley Packaged Double-Flow Aquatowers loaded on three semi-trailer trucks

Pictured here are six 100-ton Marley Packaged Double-Flow Aquatowers, half of an order for 12 going to one of the country's largest automotive equipment manufacturers. The towers will be used to cool condenser water for a 1200-ton air conditioning system. Four 3-tower units will be installed in equipment rooms with air discharge being vented through the roofs.

Need thermometers? ...ASK TAYLOR

IF you do you can't do better than call your Taylor Field Engineer. He is a specialist in temperature measurement. And Taylor makes a wide variety of thermometers for just about every possible application in the refrigeration industry. If you prefer, write for **Catalog 300.** Taylor Instrument Companies, Rochester, N.Y., or Toronto, Canada.



THERMOGUIDE* Dial Thermometer
An extremely reliable and sturdy vapor-actuated instrument for Brine Lines, Brine Tanks, Ammonia Lines, Cold Storage Rooms, Refrigerators, etc. Variety of standard ranges from minus 40° to + 120°F. Four forms of bulb and connection. Case diameter 6½".
No. 14KV123, $38

Metal Wall Thermometer
Easily read, even in dimly lighted areas. Non-fading red liquid in magnifying tube and black figures and graduations on white background. Flanged edges give tube maximum protection. Range minus 40° to + 70°F., in 1° divisions. Length 12".
No. 1106, $2.75

Taylor Industrial Thermometer
Exclusive BINOC* tubing, makes it three times easier to read. For Cold Water, Brine, Ammonia, Condenser, Hot Water and Steam Lines, Brine Tanks, Cold Storage Rooms, etc. Many bulb and stem styles and angles. Ranges minus 40° to 950°F. or equivalent Centigrade. Illustrated,
No. 1185385, $29.50

*Reg. U.S. Pat. Off.

Bi-Metallic Dial Thermometer
Gives high degree of accuracy at low cost. All-metal stainless steel construction. 3" or 5" diameter case. Stems 4", 6", 9", and 12". Separable wells, ¾" and 1"; 2" extension neck for 6" and 12" stems. Ranges from minus 40° to +750°F. Ranges up to 400°F. damped against vibration. **$16** to **$26**, depending on dial size and stem length.

Taylor Instruments
MEAN ACCURACY FIRST

CLIP AND POST!

You'll find this advertisement a convenient reference. Clip it now, and post on your shop wall.

Pressure Temperature Chart

Vapor Pressure—psig

Red Figures= inches of mercury vacuum

Temp. °F	genetron 11	12	22	113	Temp. °F	genetron 11	12	22	113
—50	28.9	15.4	6.0		55	9.9	52.0	93.3	22.0
—45	28.7	13.3	2.6		60	7.7	57.7	102.5	21.0
—40	28.4	11.0	0.6		65	5.3	63.8	112.2	19.9
—35	28.1	8.4	2.7		70	2.6	70.2	122.5	18.7
—30	27.8	5.5	5.0	29.3	75	.1	77.0	133.4	17.3
—25	27.4	2.3	7.6	29.2	80	1.6	84.2	145.0	15.9
—20	27.0	0.6	10.3	29.1	85	3.2	91.8	157.2	14.3
—15	26.5	2.4	13.3	28.9	90	5.0	99.8	170.1	12.5
—10	26.0	4.5	16.6	28.7	95	6.9	108.3	183.7	10.6
—5	25.4	6.7	20.2	28.5	100	8.9	117.2	197.9	8.6
0	24.7	9.2	24.1	28.2	105	11.1	126.6	212.9	6.4
5	24.0	11.8	28.3	27.9	110	13.4	136.4	228.7	4.0
10	23.1	14.6	32.9	27.6	115	15.9	146.8	245.3	1.4
15	22.1	17.7	37.9	27.2	120	18.5	157.7	262.6	0.7
20	21.1	21.0	43.3	26.8	125	21.3	169.1		2.2
25	19.9	24.6	49.0	26.3	130	24.3	181.0		3.7
30	18.6	28.5	55.2	25.8	135	27.5	193.5		5.4
35	17.2	32.6	61.9	25.2	140	30.8	206.6		7.2
40	15.6	37.0	69.0	24.5	145	34.4	220.3		9.2
45	13.9	41.7	76.6	23.8	150	38.2	234.6		11.2
50	12.0	46.7	84.7	22.9					

genetron®

super-dry refrigerants

There's a "Genetron" Super-Dry Refrigerant for your every need. They're available everywhere—*see your wholesaler!*

genetron 11 ORANGE LABEL TRICHLOROMONOFLUOROMETHANE
genetron 12 WHITE LABEL DICHLORODIFLUOROMETHANE
genetron 22 GREEN LABEL MONOCHLORODIFLUOROMETHANE
genetron 113 PURPLE LABEL TRICHLOROTRIFLUOROETHANE
genetron 114A DARK BLUE LABEL DICHLOROTETRAFLUOROETHANE

HANDY POCKET SIZE, TOO!

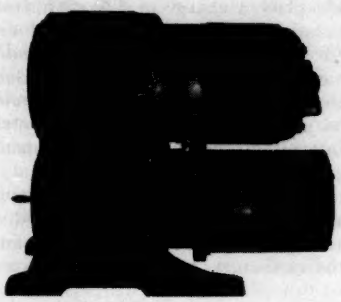
The "Genetron" pressure temperature chart above is also available—free—as a handy pocket-size plastic card, for ready reference on the job. Ask your "Genetron" wholesaler for *yours.*

Allied Chemical

genetron department
GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

Multiple Drive Power Unit

A COMPACT power unit for multiple drive system has been placed in production by U. S. Electrical Motors, Los Angeles, Calif. The Varidyne power unit is now designed with the drive motor and alternator on the same side, an important point where limited space is a factor. This unit provides variable frequency power to the Varidyne motors in the system, thus electrically linking them together. This



New Varidyne Power Unit

system has converted standard 60 cycle, 3-phase, AC squirrel-cage motors into variable speed motors. The alternator, driven at variable speeds, generates a frequency proportionate to its speed and transmits this variable frequency to each of the Varidyne motors in the system. By changing speeds at the power unit by means of a handwheel, each motor in the system varies equally and simultaneously.

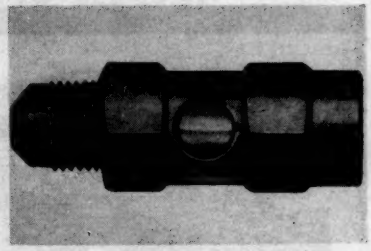
An important characteristic of the system is that it is easy to understand, easy to service and install, and offers a wide selection of motor types in regard to enclosure and speed range. Enclosures available include drip-proof, totally-enclosed and explosion-proof designs. A wide variety of internally-geared motors such as a single, double and triple reduction as well as right-angle worm gearing. A valuable characteristic of the system is that when motors are operating in tandem, as on a conveyor, each motor will share the load equally. Another important advantage of the system is that Varidyne motors may be operated on standard 60 cycle AC current either for testing purposes or for emergency stand-by power. Speed ranges for motors are available from one to 10,000 rpm and in ratios up to 5:1. Higher speed ratios can be supplied. Varidyne motors can be furnished from 1/3 to 30 hp at maximum rpm. The power units are available to carry one to 60 hp connected load.

New Refrigeration Unit

A NEW Hermetic Centrifugal Refrigeration unit available in sizes from 100 to 500 tons capacity has been announced by Worthington Corp., Harrison, N. J. Designed to meet any air conditioning installation requirement where chilled water is used, the unit is adaptable to any type of building, new or old, small or large. A bulletin containing information about the new unit is available from Worthington.

Liquid Eye Economy Unit

A NEW Liquid Eye Positive Sealing Indicator, especially designed for greater economy in mass production, has been developed by Allin Manufacturing Co., Chicago. Known as "237", the new indicator is smaller than any previous unit (1/3'd smaller in the 3/8 inch male to female size), making it ideal for those hard-to-get-at places. According to our information, the new "237" is a low cost, compact, self-contained unit having all the proved Liquid Eye features. It is available with either two or three viewing ports and comes in 3/8 inch M. FL. x 3/8 inch FE. FL. size.



New Expandable Plastic Goes Into Major Insulation Job

FIRST large-scale application of pipe insulation molded of Dylite expandable polystyrene — a recently developed product of Koppers Company, Inc. — is underway at the New York International Airport at Idlewild. Scheduled for completion during the summer of 1957, the installation consists primarily of the underground pipe insulation for cold water lines supplying the Airport's new air-conditioning system. The insulation itself is being molded and applied by Mundet Cork Corporation, of North Bergen, N. J.

In all, some 20,000 linear feet of the plastic insulation material will be utilized. Because of the nature of the air-conditioning pipeline system and conditions of the terrain it must traverse, it is anticipated that almost the entire network of piping will be under water for six months out of every year. For this reason, the low water absorption property of Dylite expandable polystyrene was particularly advantageous, Mundet officials said.

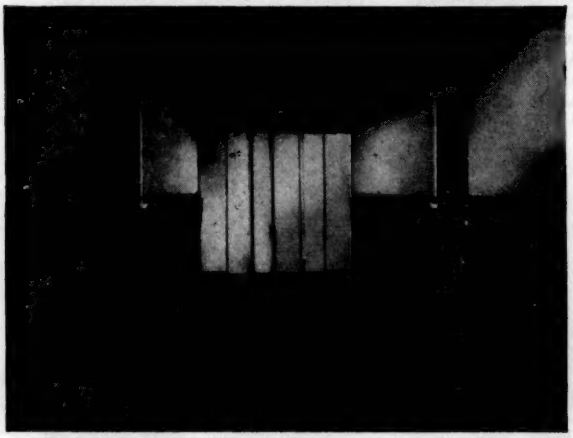
In addition, the technique of the insulation application emphasizes the importance of the compressive strength of Dylite expandable polystyrene. The plastic insulation is applied around the exterior of the wrapped pipe in a series of double semi-cylindrical sections, mopped in to the surface of the pipe with a coating compound. Each pair of sections is then wired around its outside circumference.

When the application of insulation has been completed, the entire outer surface of the now-insulated pipe is covered and sealed with another mopping of the coating compound.

Based on their experience on the Idlewild project, Mundet officials predict that expandable polystyrene will be used increasingly as an insulating material. Although the present installation at Idlewild is the first large-scale example of its use as insulation, there is every indication that it will find more widespread utility as its properties become better known.

Lightweight Dylite expandable polystyrene, a product of Koppers Company, Inc., was selected as the insulating material for a portion of the pipeline system of the new air-conditioning system at New York International Airport, at Idlewild. Some 20,000 linear feet of the plastic material was custom molded and applied by the Mundet Cork Corp., of North Bergen, N. J., for the Idlewild project.

Cold-Cel TRUCK PLATES
Engineered to Maintain Any Temperature



In sizes to fit any application. May be installed in a horizontal position suspended from the ceiling, in a vertical position along the walls, or as a partition. Can carry eutectic solutions ranging from −59° to +26°.

In standard thicknesses and connections: 4-Connection 2⅛" and 2⅝"; 3-Connection 1½"; 2-Connection 1".

LOOK FOR THIS SIGN ⬭ FOR BETTER REFRIGERATION

DOLE REFRIGERATING COMPANY
5938 NORTH PULASKI ROAD, CHICAGO 30, ILLINOIS
103 PARK AVENUE, NEW YORK 17, N. Y.

In Canada: Dole Refrigerating Products Limited
44 Elgin Street, Brantford, Ontario

WRITE FOR ENGINEERING DATA. NO OBLIGATION!

Maximum Refrigeration Efficiency
DOLE
THE Cel LINE

Cold-Cel TRUCK PLATES

PRESS BRIEFS

Industry Objects to Milwaukee Demand Charge for Water for Air Conditioning

AIR conditioning users and manufacturers' representatives of Milwaukee at a meeting of the city council objected to a city ordinance that would place a "demand charge" on large cooling systems that do not recirculate water and hence use large quantities.

The ordinance would place a charge of $20 each year for each ton of refrigeration capacity beyond three tons. It would not affect 98 percent of the home air conditioners because they either are smaller than three ton capacity or use no water at all. The demand charge would be in addition to the costs for water at regular rates which is levied against all air conditioning equipment that uses water.

After more than two hours of hearing, the common council's utilities committee decided to form a committee of 10 city officials and representatives of users and manufacturers to study the ordinance and report their recommendations later.

Spokesmen for the industry and users claimed that the ordinance was discriminatory. But many of them agreed that something must be done to conserve water. It was suggested that instead of the demand charge the city might seek another general water rate increase. But committee members replied that a rate increase would hit everyone, whether or not they used air conditioning, which would require all water users to subsidize air conditioning users.

Ald. Alfred C. Hass said that water shortages could not be blamed on air conditioning users alone. He said that household washing machines and dishwashing machines also used a lot of water. Growing use of air conditioning, said Ald. Matt Schimenz, committee chairman, is straining the water system. They cited the report of Black & Veatch, the city's waterworks expansion consultants, to show that existing air conditioning equipment used water at the rate of 50 million gallons a day, and if no controls were established, that rate soon would be doubled. This report urged that the city discourage installation of air conditioning equipment that did not recirculate water and encourage installation that did.

American Ice Shows Increased Profits

AMERICAN ICE Co. is expected "at least to break even" in the first quarter this year, in contrast to the $20,352 net loss reported for the period last year, Peter A. Buehrman, president, said at the annual meeting. Favorable returns from coal and fuel oil distribution enabled the company to show a profit of $44,000 in January and the February profit would have been as much if not for New York strikes, Mr. Buehrman said.

"I think it is fair to assume that we will have a better year than in 1956," the executive declared. Last year, the company said, because of unfavorable weather conditions in the summer when sales of ice are heaviest, net earnings declined to $264,057, or 55 cents a common share, from the $501,537, or $1.15 a common share, in 1955.

The company bought 23,835 shares of its common stock last year in the open market for $285,950, reducing the outstanding common to 350,000 shares. An additional 500 shares were purchased in February this year, Mr. Buehrman said. In January this year, Mr. Buehrman said, the company bought for approximately $250,000 the Soranno Coal & Fuel Co., New York City distributor.

Chemical Ice Extends Shrimp Storage

AGRICULTURAL chemists at Louisiana State University have announced discoveries of the use of chemical ices for the preservation of shrimp. The discoveries extend the storage life of fresh shrimp. The scientists tested 12 ices differing in chemicals and concentration. They said an ice made with sodium bisulfite resulted in "delayed deterioration and spoilage for approximately two days." The ice is made from water containing the chemical at very little additional cost.

Dr. Ernest A. Fieger, professor and head of the department of agricultural chemistry and bio-chemistry, who directed the studies, was assisted by Dr. Arthur F. Novak, biochemist with the Agricultural Experiment Station, and Milton E. Bailey of DeRidder, a graduate student. Dr. Fieger said the chemical ice also proved to be "very effective" in preventing melanosis, particularly during the latter part of the storage period when it becomes most severe. Melanosis is the formation of black spots on stored shrimp.

Ordinarily, shrimp stored in non-chemical ice retain top quality for the first six to eight days. After this they have a flat taste, but are still edible. After two weeks of ice storage, shrimp generally are considered undesirable for human consumption.

Alford Warehouse Expands

A 150,000 square-foot expansion is being made by Alford's Refrigerated Warehouses, Dallas, Texas, a result of a new contract with the General Foods Corp. of White Plains, N. Y., Fred F. Alford, president has disclosed. Mr. Alford's announcement coincided with information that General Foods has expanded the distribution facilities of three divisions by setting up warehousing in seven additional key cities, including Dallas.

Mr. Alford pointed out that his expanded contract with General Foods presents a new concept in warehousing. "We are leasing space to General Foods, but we will provide all manpower and equipment needed to receive, store and distribute their merchandise," he said. "After their inventories are built up we except to handle several thousand carloads a year for them."

Original Alford facilities included two buildings, each 250 by 700 feet. Preliminary plans have been made for the construction of a dry storage building in the near future, Mr. Alford said. Total space at the warehouse will increase to 1,185,000 square feet or 22,500,000 cubic feet when all contemplated construction is complete, he declared.

Cold Storage Expands for Fishery Products

A MULTI-MILLION dollar fish products industry is being planned in New Bedford, R.I., according to a news report, in which Merchants Cold Storage & Warehouse Co. Providence, R.I. will have a prominent part.

Under the plan now under consideration, Quaker Oats Co. of Chicago would build a $2,500,000 plant to process its line of fish products pet food. The Providence storage firm would build a $1,000,000 freezer plant for storage of the finished product.

Carl E. Johnson, secretary of Merchants Cold Storage, said that his firm already has land in New Bedford. He said the city industrial commission is trying to attract a related industry such as Quaker Oats, to help make a large storage facility worthwhile.

The New Bedford project will be an expansion of the cold storage firm and will not affect the company's operations in Providence, Mr. Johnson said.

If your answer is NO... or DON'T KNOW—

How did your refrigeration stack up last summer? If there were any weak spots in your set-up, right now is the time to get your plans set for the coming season, so it can't happen again.

Here are some things to look for:

Have you enough compressor capacity?

Will you get the temperatures you need in your milk room—your hardening room?

Have you sufficient ice-builder capacity for best economy?

Can you depend upon your compressors—or will you be taking a chance on breakdowns and high repair costs?

Can you freeze as many novelties as you can sell?

If the answer is *no*—or *don't know*—to any of these questions, it will be well worth your while to have a CP Refrigeration Engineer sit in with you, now. Then you and he can determine how you can meet your needs most exactly and economically.

Whether it's a Compressor, or Booster—an Ice Builder—a hardening tunnel or a completely engineered Refrigeration system, CP can provide what you need, economically and with satisfaction assured.

THE *Creamery Package* MFG. COMPANY

General and Export Offices:
1243 W. Washington Blvd., Chicago 7, Ill.
Branches in 23 Principal Cities
Creamery Package Mfg. Co. of Canada Ltd.
267 King Street, West, Toronto 2B, Ontario

ANOTHER CATERPILLAR FIRST!

CERTIFIED POWER

FOR CAT* DIESEL ENGINES

CATERPILLAR TRACTOR CO.

ENGINE POWER CERTIFICATION

This is to certify that the Diesel Engine herein described has been engineered, manufactured and tested in accordance with rigid Caterpillar Standards. The materials and workmanship incorporated into this engine give it the inherent capacity for satisfactory performance when applied in accordance with the power ratings established and recommended by this company. The MAXIMUM OUTPUT capacity of this standard production engine is 200 H.P. @ 2000 R.P.M. equipped with: air cleaner, water pump, lubricating oil pump, fuel pump, and standard intake and exhaust manifolds

I certify that B. L. Henson, Supervisor of Diesel Engine Test, Caterpillar Tractor Co., ... Certification and I affix my ... 57

B. L. Henson
Supervisor Diesel Engine Test
Caterpillar Tractor Co.
Peoria, Illinois

... 11/30/58

Caterpillar Model D326 Industrial ... was manufactured and shipped as follows: Engine Serial No. 3981018 Shipping Date February 11, 1957

Power Setting 152 H.P. @ 1600 R.P.M. Intermittent Power Rating

... nts

Radiator & Fan
Ether Starting Aid
32V Charging Generator
Governor Control
Tachometer Drive
Muffler
Heater Connections
Remote Shut-off

POWER RATINGS

MAXIMUM OUTPUT is the horsepower capacity of the engine, a measure of the maximum power, ± 5%, that can be developed for five minutes without drop in speed.

INTERMITTENT HORSEPOWER is a rating for use in variable load applications such as excavators, hoists, and standby power units, where the duration of sustained full power output is one hour or less, with the average output not over 90% of Intermittent Horsepower.

RATED HORSEPOWER is a rating for use in applications such as planing mills, hammer mills, and rock crushers where the duration of sustained full power output is 12 hours or less

CONTINUOUS HORSEPOWER is a rating for use in applications such as work boats and pumps where the duration of sustained full power output is 24 hours per day, day in—day out.

Horsepower figures are established in accordance with rigid Caterpillar standards. All ratings, corrected to sea level barometric pressure (29.92 in. Hg.) and standard temperature (60°F), apply to a production engine including air cleaner, water pump, lubricating oil pump, fuel pump and standard intake and exhaust manifolds. The above ratings are based on British and American BHP.

Printed in U.S.A.

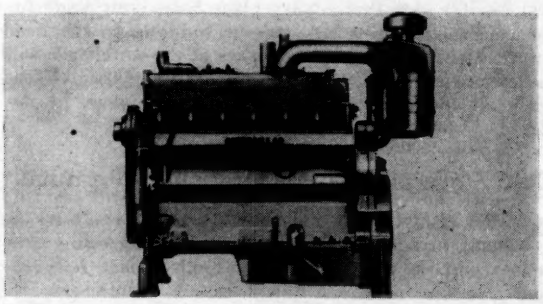
Form No. 915-32553

In a quarter century of diesel leadership Caterpillar Engines have achieved a reputation for *honestly rated power*. Owners have found that they can depend on a Cat Diesel to deliver the power promised.

Now, to back this reputation, Caterpillar becomes the *first* manufacturer to issue a certificate showing the horsepower capabilities of the engine. This certificate is signed by Caterpillar Tractor Co. and certified by a notary public.

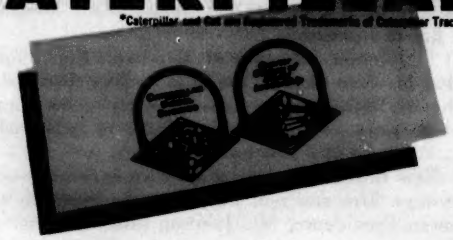
You have a right to demand *certified power* when you invest in an engine. You get it when you buy from your Caterpillar Dealer. Let him show you the certified power plant that fits your needs.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.



CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.



In the Spotlight

SPEEDIER handling of merchandise is provided in the layout and design of the new Vinita Park (St. Louis) warehouse of the Merchants Refrigerating Company. A new feature is a separate building divided into twelve rooms for individual use of tenants. Notable innovations include ample loading platform space which is air conditioned, use of straddle lift truck, eliminating supporting columns in freezer rooms, simplified stock control, and underground heating system to prevent frost heaving. For complete description of refrigeration layout and other features see article starting on page 13.

MORE ATTENTION to profit planning and better selling of the industry's services were the principal theme of the annual conventions of the American Warehousemen's Association and the National Association of Refrigerated Warehouses, held at Atlantic City, the week of April 1. Other main subjects discussed were the labor problem, storage and supply of perishables by the U.S. Army and prospects for the business outlook. Reports of the president and executive vice-president were made, and safety awards were presented. Highlighting the discussion of the labor situation was an address by the Hon. Fred A. Hartley, former United States Congressman, co-author of the Taft-Hartley Management Relations Act. For a detailed report of the convention see page 19.

AN UNUSUAL load carried by British trucks by a Dutch transport company is strawberries embedded in solid blocks of ice, a method which avoids the need for packing, the blocks being handled in quantity and slid along the floor of a refrigerated vehicle without risk of damage to the fruit.

ATTENTION to new technical developments as a major part of its future program was emphasized by The Refrigeration Research Foundation at its annual meeting at Atlantic City. It was pointed out that large opportunities for advancement in commodity refrigeration lie ahead and that adoption of new technical developments may become a very important part of this development. For report of the meeting, see page 25.

A RESEARCH program pointed toward providing consumers with the best possible frozen and cold storage products was urged at a recent meeting of the Research Advisory Committee of the United States Department of Agriculture. Specific areas were outlined in which new or expanded research by the Department is needed. For additional details on this program see article on page 30.

THE MID-SOUTH Refrigerated Warehouse Company, Memphis, Tenn., has announced start of constructing 250,000 cubic feet of additional freezer space adjacent to its present plant. It is being made available to keep in step with the expanding production by growers of fruits and vegetables made available on acreage displaced by shrinking cotton allotments. For details see story on page 30.

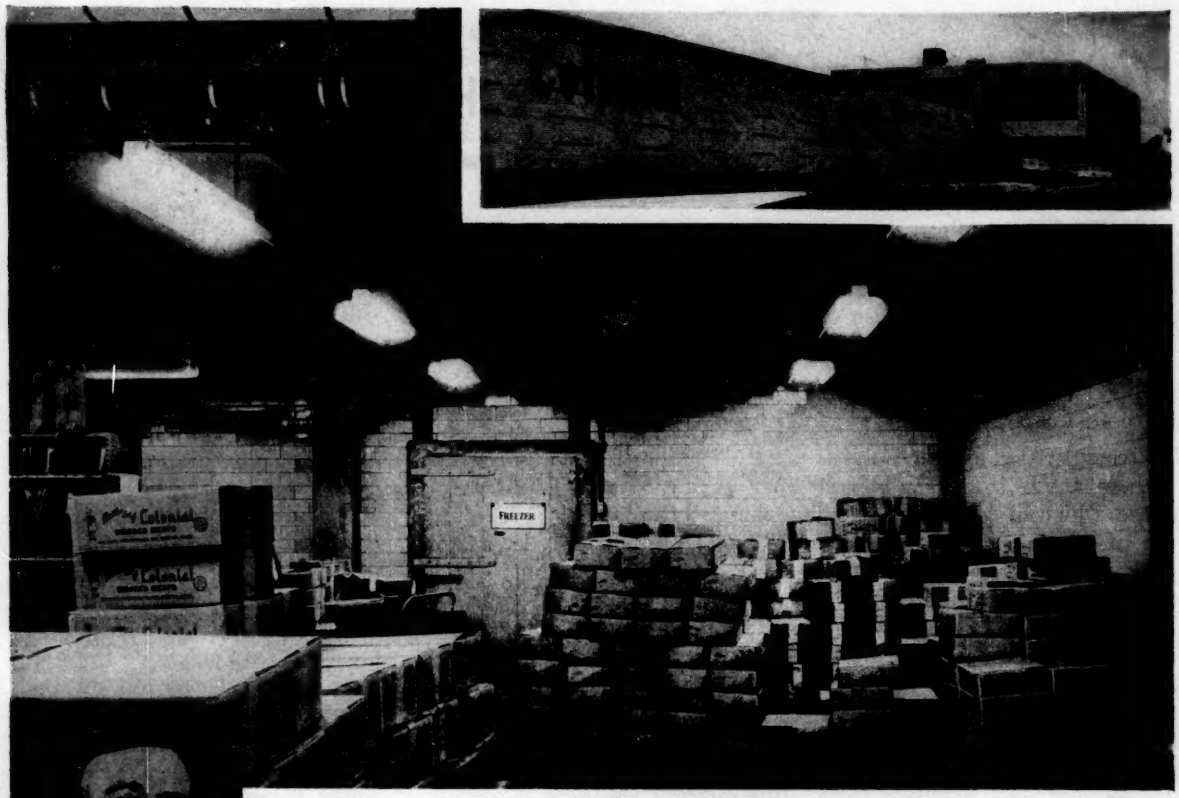
A NEW Ice Industry film will be produced by The National Association of Ice Industries, suitable for television, club meetings, and group showings. The film will be educational in nature and will point up the romantic aspects of the industry, with emphasis on new developments. For additional details, see page 59.

TWO ELECTRICAL maintenance papers have been planned for the current series of NAPRE plant failure prevention series. First of these articles makes its appearance with this issue, starting on page 35. In addition to the procedures to be followed in inspection and service features of a maintenance program, this presentation prescribes certain operating ideas for improving efficiency through power factor correction. In the introductory remarks the author not only describes the different designs briefly (with regard to power factor) but outlines also the principal parts of elements of the synchronous machine, their speeds and applications.

Snow Made To Order

TWO powerful air compressors, a centrifugal water pump, aluminum irrigation pipe and 40 sprinkler heads were used by Larchmont Farms Co. in Lexington, Mass., to make snow to order. Enthusiastic skiers enjoyed a winter wonderland about 60 miles north of New York City in spite of weather conditions which left snow starved slides, according to Aluminum News, December 1956.

Water and air pumped through the aluminum irrigation pipe merge at the sprinkler heads, vaporizing the water and driving it into the air in tiny droplets which turn to snow crystals. One compressor supports 25 sprinkler heads which deposit over one inch of snow an hour over half an acre. The system uses aluminum pipe to carry both water and air, and the snow can be made to order on any frozen ground. The use of this system eliminates disappointments to skiers and operators of ski resorts; one operator is convinced that the equipment will pay for itself out of extra profits earned in a single season's operation.



"Our new $2 million plant uses Fiberglas Insulation exclusively . . . we're sold on it!"

—declares Chief Engineer Raymond J. Ghizzoni of Boston's Colonial Provision Company

Five years of planning went into Colonial's striking new 400-employee packing plant in Roxbury, Mass.—one of the largest in the East . . . processing over a million pounds of meat each week. This giant new installation replaces Colonial's three previous plants—all cork-insulated. Colonial's Treasurer Samuel Rabinowitz and Chief Engineer Raymond J. Ghizzoni tell why they switched to Fiberglas Insulations exclusively . . . *throughout* their new assembly-line plant:

"The product was best in its field: top thermal quality, easy to install, and the price was right . . . Now we've got 1 million cubic feet of space wrapped in Fiberglas—it even partitions 45° F. rooms from the −14° F. deep freezer!

"We enjoyed 100% service—the installation was supervised by three Owens-Corning engineers plus three engineers from New England Insulation Company—we don't expect trouble for 100 years! . . . There just isn't any maintenance—no odor, peeling, flaking or moisture back-up.

"We're so pleased with Fiberglas Insulation we've got it on steam and refrigeration pipes, too! We'd recommend it to anybody . . . in fact, we have—even to visiting packers from Europe!"

Ready to specify insulation for *your* low temperature structure or equipment? You'll want to compare *proven-superior* Fiberglas Insulations with any other materials. Get all the facts now—MAIL COUPON TODAY!

Owens-Corning Fiberglas Corporation
Dept. 165-E, Toledo 1, Ohio

Please send me free the booklets I have checked:

☐ *Insulation for Low Temperature Structures and Equipment*
☐ *PF Design Details*
☐ *Why the Trend is to Fiberglas*

Name and Title_____

Company_____

Address_____

It's amazing the difference Fiberglas makes!

OWENS-CORNING FIBERGLAS

*T.M. (Reg. U.S. Pat. Off.) O-C.F. Corp.

Modern Warehouse in St. Louis Designed For Speedier Handling of Merchandise

Merchant's Refrigerating Company's suburban St. Louis warehouse is of strictly modern design. Careful planning of the refrigeration plant and newest handling equipment helps to conserve refrigerated space.

VERNON C. ALEXANDER

Machinery & Systems Division
Carrier Corporation

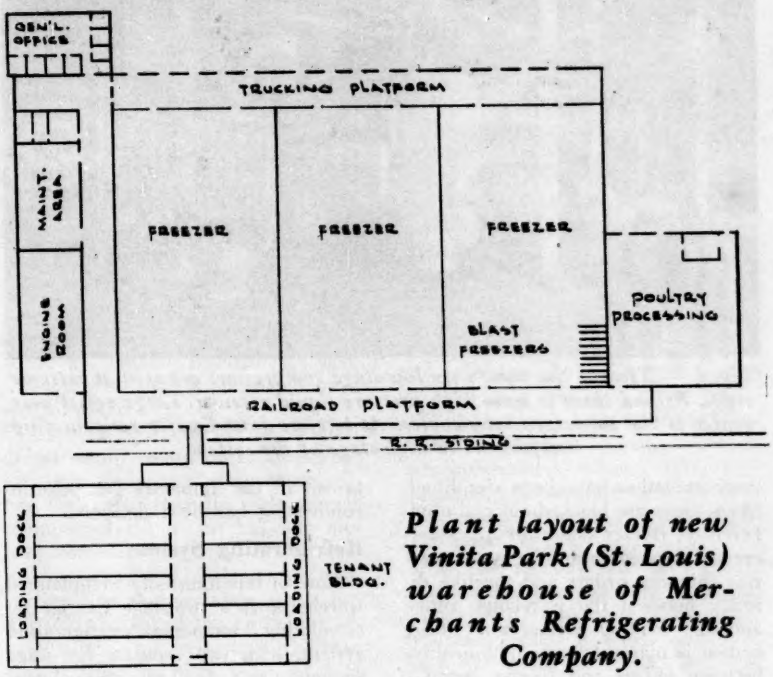
THE NEW Merchants Refrigerating Company warehouse in suburban St. Louis incorporates advanced thinking not only in the design of its Carrier ammonia recirculating refrigeration system, but in allied features of the plant itself — from air-conditioned truck docks to space-saving lift trucks — which enable operators to make the most efficient use of refrigerated space.

This company, one of the country's largest food warehousers, has for many years operated a plant in St. Louis proper which had become inadequate to handle recent distribution problems. Thus, the new warehouse, located three miles outside the city limits on a 26-acre tract in Vinita Park, has been designed for accessibility and for fast handling of frozen food products, and is geared to meet distribution demands created by widespread suburban developments.

Besides 1,500,000 cu. ft. of refrigerated storage space, the Vinita Park plant offers something new in food warehousing facilities, a separate building containing 400,000 cu. ft. of refrigerated space, divided into 12 rooms of 3,000 or 1,800 sq. ft., which can be leased by tenants for their individual use. There are 16 adjoining offices from which tenants can conduct warehousing operations of their own.

Estimated storage capacity of the three freezer rooms in the main building is 14 to 15 million pounds. Ten tunnel-type blast freezers, located accessibly at the extreme north corner of the main building (see plant diagram), have a capacity of 100,000 pounds each 24 hours.

Plant designed and constructed in consultation with Nils R. Bernz, vice-president and director of engineering, Merchants Refrigerating Company.



Plant layout of new Vinita Park (St. Louis) warehouse of Merchants Refrigerating Company.

The plant has been engineered throughout for utmost economy in operation of the refrigeration system, which is housed centrally in an engine room section of the warehouse where it in no way interferes with maximum utilization of storage space. (See cover picture)

Innovations

Some of the notable innovations at Vinita Park, aside from the refrigeration equipment itself, are:

(1) Main warehouse loading platforms, 25 feet wide and providing for the unloading of 14 trucks at once, are completely enclosed and air conditioned. Canvas coverings, extending around platform entrances and access doors to trucks, minimize cold air leakage. Dock levelers are automatically adjusted to the height of tail gates, thereby simplifying movement of lift trucks during loading and unloading.

(2) By enclosing and air conditioning loading platforms, a separate corridor dividing the truck docks from freezer rooms is eliminated. Access to freezer rooms is directly from loading platforms, minimizing the possibility of defrosting as product is moved, and saving considerable handling time. Conventional flapper doors on freezers are replaced by electrically-operated sliding doors, with controls located overhead so they can be reached easily by an operator without dismounting his lift truck. An electric heater-strip along the mating surfaces of the doors prevents freeze-up of condensate.

(3) Nine straddle-type lift trucks, capable of carrying 3,000 pounds loading capacity and of maneuvering in minimum space, replace conventional fork lift trucks. Consequently, for stacking purposes, separating aisles are reduced in size from an ordinary width of about 11 feet down to 7 feet. This gives greater storage capacity per quantity of refrigerated space.

(4) Fluid concept in design of the three freezer rooms provides each an open stacking area of 120 ft. by 207 ft., with a clear ceiling height of 15 ft. 7 in. There are no supporting columns. This gives faster access to merchandise, and further conserves refrigerated space. Ordinarily, fitting stock around supporting columns would account for the loss of a considerable number of pallet spaces. Here, pallets can be stacked three deep in continuous rows.

(5) Stock control and inter-plant

Fig. 1 — Two of the plant's six low-stage compressors are seen at extreme right. Behind them is main high pressure liquid receiver. Large vessel near center is the interstage inter-cooler. At left are four Carrier reciprocating compressors in high-stage of the system.

communication have been simplified. Stock areas are blocked out and numbered on freezer floors for quick reference. A pneumatic tube system carries shipping orders and the like directly between the warehouse office and the loading platform. A TBX system is planned for communication between offices and freezer rooms.

(6) For economical operation of an underground heating system to control temperatures below the warehouse and thus prevent possible damage due to frost heaves, a method of recovering the super heat contained in the ammonia gas prior to condensing has been designed.

Refrigerating System

Core of this unusually well-planned warehouse is a two-stage Carrier recirculating ammonia refrigeration system, with two separate low-stage suctions, one for all storage-area freezers in the warehouse and tenant building, and one for blast freezers. The equipment, automatically controlled by an electronic alarm and shutdown system for unattended overnight or weekend operation, provides 380 tons of refrigeration at minus 20 F evaporating temperature for freezer storage rooms, and 66 tons of blast freezer refrigeration at minus 40 F evaporating temperature.

Low-stage equipment in the freezer system consists of four rotary compressors of 95 tons each, or a combined capacity of 380 tons, direct driven by 75 hp 700 rpm induction motors. They operate at minus 20 F suction with a discharge pressure of 33.5 pounds.

On the low-stage of the blast freezer system there are two Carrier 5J63 reciprocating compressors, direct driven by 60 hp 700 rpm induction motors. Operating at minus 40 F suction and 33.5 pounds discharge, each has a capacity of 33 tons, or 66 tons total. If operated on freezer load at minus 20 F suction and 33.5 psig discharge the capacity of these compressors will be increased to 66 tons each or 132 tons total.

Each of the booster compressors is cross connected so that it can be operated on either the blast freezer or freezer load.

All of the reciprocating compressors in the system, high as well as low stage, are equipped with automatic capacity controls, providing exceptional flexibility for daily or seasonal load variations. All capacity controls are actuated by suction pressure switches. The six cylinder booster and high stage compressors can be operated automatically at 1/3, 2/3 or full load. The four cylinder high stage compressors can operate at ½ or full load. A feature incorporated in the automatic capacity control insures each compressor starting up

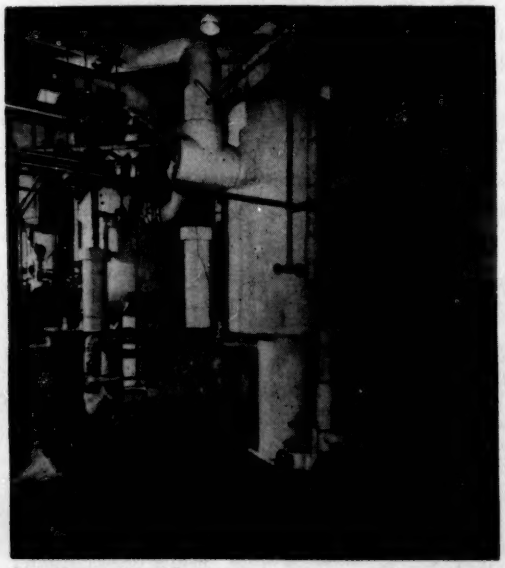


Fig. 2 — Liquid ammonia pumps and accumulators for freezer and blast freezer systems. Accumulator at right is for blast freezer. Accumulator in background is for freezer. Other small pump is for seal oil.

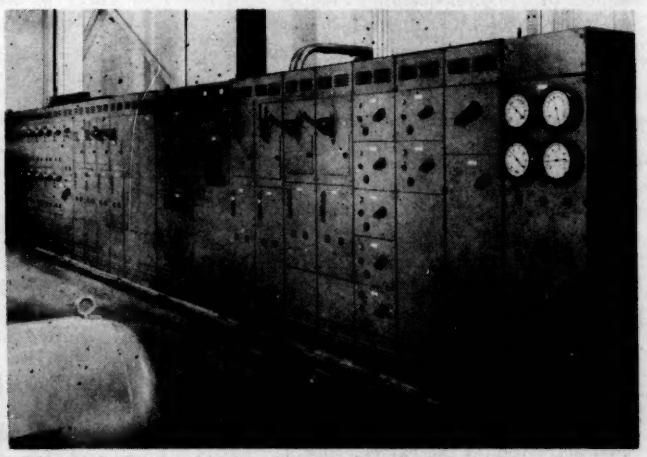


Fig. 3 — View of control panel for plant's refrigeration system. It houses incoming main lighting and power circuit breakers and metering equipment; provides combination starters with fused disconnects for all principal motors in the refrigeration system; incorporates a control wiring system equipping the plant for unattended automatic operation overnight or on weekends.

under minimum load, thus permitting the use of normal torque motors.

Low-stage compressors discharge to the high-stage compressors via a common interstage line, through a common oil separator, and into a combination inter-cooler of the internal coil type which de-superheats the discharge gas and sub-cools liquid ammonia.

High stage of the system consists of two Carrier 5J61 compressors, of 128.5 tons each or 257 tons total, direct driven by 150 hp 700 rpm induction motors, and two Carrier 5J41 compressors, of 85.7 tons each or 171.4 tons total, direct driven by 100 hp 700 rpm induction motors. Two of these four compressors are cross connected to permit operation as boosters, or for single-stage service such as would be necessary to put the plant in operation initially or during periods of reduced load and low condensing pressure.

On high stage compressors, capacity controls are arranged so that these machines adjust themselves to maintain constant interstage pressure.

These compressors discharge through a common header to a discharge oil separator, then through a shell and tube heat exchanger which forms part of the underground heating system, before finally going to evaporative condensers located on the roof.

There are seven Carrier 9E12 evaporative condensers with 475.5 tons total capacity, based on 78 F wet bulb, with fans handling 25,000 cfm each.

As another factor in refrigeration plant flexibility, each of the condensers has its own remotely-located recirculating pump, taking suction from a common sump tank located in an area adjoining the engine room. Water returns from condensers through a common 10-inch header.

Reason for indoor location of pumps and sump tank is to eliminate the possibility of freeze-up during a severe winter and permits the use of a single water-treating system. From this same sump, circulating water pumps take suction to supply water to compressor oil coolers and heads. This water can be returned either directly to the sump tank or into two of the evaporative condenser pans on the roof for any additional cooling which may be required.

It is interesting to note that in summer, water coming from condensers and returning to the sump tank is actually cooler than that available in city-water supply mains.

In the recirculating system, minus 20 F liquid ammonia for evaporative coils in freezer rooms is supplied by a 125 gpm centrifugal liquid-ammonia pump, having a 150 ft head. This pump takes suction from the leg of a 72 in. dia suction accumulator, into which both the excess liquid feed is returned and the sub-cooled plus 20 F make-up from the inter-cooler is added. Minus 40 F liquid ammonia for the blast freezer is supplied by a 15 gpm centrifugal liquid ammonia pump, having 125 ft head. This pump takes suction from the leg of a 42 in. dia accumulator. An extra pump in each case serves as a standby.

These centrifugal liquid ammonia pumps are selected to operate with net positive suction heads of not more than 3 ft. Each pump is equipped with a double mechanical seal, through which oil is circulated by a seal oil pump.

A special provision for draining off excess liquid returning to accumulators is made in each of the three suction lines; that from the main freezer room, from the tenant building and from the blast freezers. This is done by increasing the diameter of each suction line and draining excess liquid into the leg of the particular accumulator. This reduces turbulence and provides a more even level of liquid in the accumulator, thus insuring proper functioning of the float controlling make-up liquid supply.

Freezer Rooms

In designing the three large freezer rooms in the main warehouse, it was the intent to provide a clear stacking height of just under 16 feet over the entire floor area, without intervening columns and without the loss of space to refrigeration or air-handling equipment. Thus, evaporator coil and fan units have been located in truss spaces overhead.

Each room has four coil and fan units, each with its own supply air duct system. Units are arranged so that each serves one-quarter of the total room area. Each unit consists of two special Carrier 15AB11 prime-surface coils, designed for horizontal air flow and arranged end to end. Face opening of the coil is 3-½ ft high by 20 ft long; each coil is supported on a base section which contains a drain pan that, for ease in defrosting, slopes diagonally toward the outside end. By means of a sheetmetal duct transition, air passing through both coils is directed to a single Carrier 27N11 fan section, from which it is discharged into one of four supply ducts. Each of the four fans in each freezer room supplies air at a rate of about 30,000 cfm. For flexibility of operation, each fan is driven by a two-speed motor.

Defrosting is accomplished by means of hot gas and water, or of water alone. Inlet louvres are provided on all coils so that, during defrosting, water will not splash into the product below.

Coils are designed for top feed. To insure even distribution of liquid through all of the 32 parallel ¾ in. coil cricuits, each has an orifice inserted in its supply end at the manifold connection. From the liquid supply manifold, ammonia flow is entirely by gravity, through the serpentine-constructed coils, then through the suction line and back into the accumulator.

Instead of being located in freezer rooms as is ordinarily the case, control valves are located outside in the enclosed dock area.

With top-feed coils, there is considerable reduction in defrosting time over conventional flooded coils, since liquid supply can be shut off and that remaining in the coil will rapidly drain off by gravity.

In the tenant building, freezer rooms are of two sizes, six rooms are 30 by 100 ft and six are 30 by 60 ft., separated by 20 ft access corridors. Each size group has its own shipping dock.

Evaporators in each room consist of two plate fin coils, having 7-inch square fins with 1-½ inch fin spacing. Coils are each four pipes wide. Those in the large rooms are 75 ft long, and in the small rooms 50 ft long.

The liquid feed to each coil is controlled by an orifice, located in the liquid line serving each coil, to insure even distribution. Oversize strainers are located in the line ahead of the orifice to protect against blocking. These coils can be defrosted separately by means of hot gas. The main suction line serving the building to which these coils connect slopes slightly toward the engine room, so that liquid drains by gravity into the main freezer accumulator.

Tunnel-Type Freezers

The 10 tunnel-type blast freezers, located in one corner of the north freezer room to make them directly accessible to a poultry processing area adjacent to the main warehouse, are designed to quick-freeze 100,000 pounds to 0 F each 24 hours.

The rooms are 3 ft 7 in. wide by 20 ft long by 6 ft high. In the blast freezer refrigeration system, there are five coil and fan units, each serving two blast freezing tunnels. Each coil

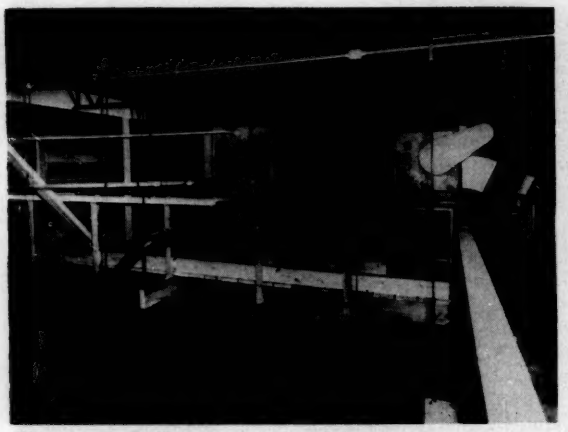


Fig. 4 — Installation of coil and fan unit in truss spaces above main freezer room. Four such units serve each of three freezer rooms and each unit has its own air supply duct, as well as a 2-speed fan for flexibility.

Fig. 5 — Three of the larger rooms, each of 3,000 sq. ft. without separating partitions, occupied by one tenant, in the separate tenant building. Overhead are plate fin pipe coils. Coils, defrosted by means of hot gas, can be defrosted separately so operation of the room is uninterrupted.

and fan unit consists of two coil sections and a fan section having two wheels and is located on top of the blast freezer tunnels. Such an arrangement of components permitted the use of equipment of standard lengths, which would otherwise have been impossible due to the small size of the blast freezer rooms.

Special 14-row prime surface coils for horizontal air flow are arranged one atop the other in each unit. Both coils are supported by a base section which contains a sloping drain pan. A sheetmetal duct transition connects these coils to a single Carrier 15AB9 fan section which supplies approximately 12500 cfm to each of the two blast freezers its serves. The fans of both freezer and blast freezer units are located on the leaving air side of the coils.

These coils, like the others, are excess-fed, and utilize the liquid recirculating principle. But due to the remote location of the blast freezers and inadequate headroom available for the coils serving them it was impractical to provide a direct gravity return. Therefore, an alternate method to return liquid was employed. A double-pipe suction riser is used to raise liquid returning from the blast freezer coils to the level of the main blast freezer suction line located high in the truss space. From that point, it is returned by gravity to the accumulator in the engine room.

These coils, like those in the main freezer rooms, are defrosted by hot gas and water. Provision is made for rapidly removing liquid from the coils with hot gas pressure prior to defrosting by means of a separate liquid drain line which is connected into the main blast freezer suction line. Louvres to prevent water spray are provided on the entering and leaving side of the coils. The reason for louvres on both sides is due to the difference in elevation of the coils and fan and the design of the sheet metal transition.

Another feature of the plant which contributes to flexibility of operation is achieved by use of a transfer receiver into which liquid from any low or intermediate pressure vessel can be diverted without interrupting normal plant operations. Liquid is drained from this vessel into the high pressure receiver by gravity.

Air Conditioned Truck Dock

A unique feature of the plant is its air-conditioned truck docks, planned both to reduce infiltration of outside air and to protect product quality during handling. The enclosed truck docks have insulated ceilings.

Air conditioning is provided by six Carrier 39T5 Weathermaker Units

Fig. 6 — With coil and fan units installed within truss spaces, freezer rooms offer clear ceiling height of nearly 16 ft. Note absence of supporting columns. Stock areas are marked out on floor for ease in locating merchandise.

Fig. 7 — Coil and fan units for 10 tunnel-type blast freezers. Each of five coil and fan units serves two blast freezers. Because of space limits, coils are arranged one atop the other, and a sheet-metal duct transition connects each pair of coils to a single two-wheel fan that supplies 12,500 cfm to each blast freezer it serves.

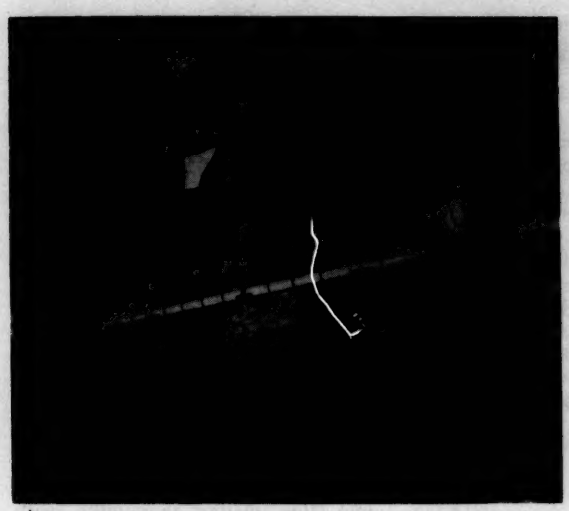


Fig. 8 — A new trend in food warehousing is this air conditioned truck dock, which eliminates the corridor ordinarily used to separate loading platforms from freezer rooms, and simplifies handling techniques. Just below ceiling is one of the six Carrier Weather-maker fan-coil units which provide conditioned air of 45-50 F. Entrance door to freezer room, lower left, is electrically controlled, and replaces conventional flapper doors.

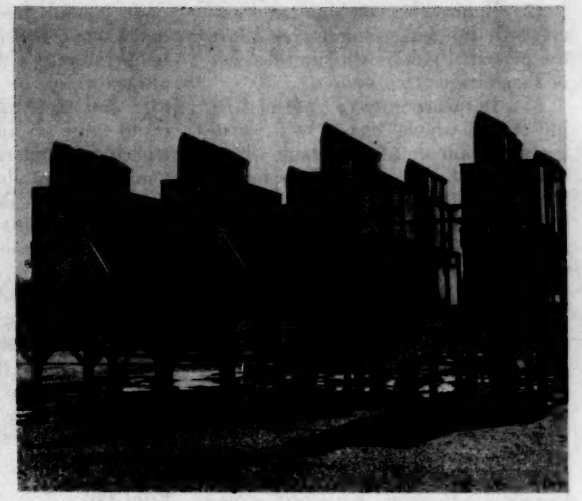


Fig. 9 — View of seven Carrier evaporative condensers located on the warehouse roof above engine room.

of the spiral-fin coil type, arranged for horizontal air flow. Capacity of each unit is four tons. Units are suspended from the ceiling, and are evenly spaced along the dock. They are designed to operate at 30-35 F suction and maintain 45 to 50 deg. F dock temperature.

The suction header from these units are connected into the inter-cooler shell and a combination back-pressure and solenoid stop valve is located in this line adjacent to the inter-cooler. Truck dock units are fed by thermal expansion valves. No defrosting is required since they operate above freezing.

The same liquid and suction mains which serve these truck dock air conditioning units also supply the refrigeration for the office air conditioning by means of an ammonia to calcium brine heat exchanger. The suction from this brine cooler is controlled by a back-pressure valve.

Automatic Controls

The new warehouse incorporates many automatic control features in a system designed to insure safe, unattended operation over prolonged periods.

Basically, the central control panel, located in the engine room, performs three different functions:

(1) It houses incoming main lighting and power circuit-breakers, and necessary metering equipment;

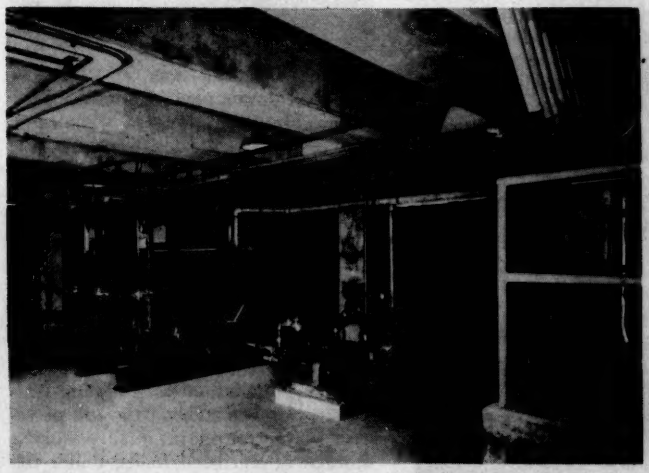


Fig. 10 (above) — Condenser water pumps surround sump tank, located indoors in area adjacent to engine room, to eliminate possible winter freeze-ups and to permit the use of a common water-treating system for the whole warehouse. To right of sump tank are two circulating water pumps (one is a standby). Circulating water pumps take suction from sump tank to supply water to compressor oil coolers and heads.

Fig. 11 (right) — Shell and tube heat exchanger used to recover the superheat contained in ammonia gas before it passes to evaporative condensers. Heat is transferred to oil which is circulated through an underground piping network to control ground temperatures below warehouse.

(2) It provides combination starters with fused disconnects for all of the principal motors which are a part of the refrigerating system;

(3) It incorporates a control wiring system which consists of a warning and plant shutdown circuit which is connected into the ADT transmitter.

The ADT warning circuit transmits an alarm to the local ADT Company office upon the failure of certain mechanical equipment, or upon abnormal temperature or pressure conditions, or liquid levels existing in the refrigeration system. ADT alerts either the plant engineer at home or, in his absence, an appointed refrigeration service company, so that one or the other can go to the plant, ascertain the cause of and correct the equipment failure, and return the plan to normal operation.

This warning circuit basically gives a warning of high and low liquid levels in the two accumulators and the inter-cooler. Each reciprocating compressor has a high-pressure control and oil safety switch which functions on failure of the lubricating oil pressure in which case the particular compressor will be shut down and the alarm transmitted.

The plant shutdown circuit functions at times of extreme high level of liquid in the accumulators or the inter-cooler; of extremely low pressures in the discharge lines of the blast freezer and freezer liquid pumps, seal oil pump and circulating water pump; or of high interstage pressure or high-stage high pressure. On shut down a main liquid line solenoid valve located at the receiver outlet is closed, along with the three solenoids feeding liquid to the two accumulators and inter-cooler. Plant shutdown will also close the combination back-pressure and stop valve located in the suction line from the truck dock air-conditioning units.

To provide operators with a positive indication of the position of all solenoid valves, lights which will burn when the valve is open have been located adjacent to each valve.

For startup from any shutdown (emergency or routine), a hand-automatic switch is provided to bypass those pressure switches on the pumps which are down. On high-level shutdowns, and ADT warning alarms it is necessary to reset the control relays. An indicating light is provided to show that all relays have been reset.

Floor Heaving Eliminated

Even though the warehouse floor is well insulated, the possibility of underground freeze-ups and consequent floor heaving due to the low temperatures within the warehouse always exists in a plant of this nature and size. Since such freeze-ups could cause severe damage if not controlled, an underground heating system was installed, thought to be unique both in design and operation for plants of this type.

It consists essentially of an underground network of piping through which heated fuel oil is recirculated to control underground temperature. In the main freezer building served by this system, there are a total of 120 pipes, each approximately 250 ft long and 1-½ in. in diameter located in the sub-slab, in rows on 3 ft centers.

Fuel Oil

All of the heat required to warm the oil (No. 2 fuel oil) to the desired temperature is obtained from the superheat contained in the high pressure discharge gas. Provision is made for boiler steam to provide any additional heat required if insufficient heat is contained in the hot ammonia gas.

The fuel oil is supplied to the piping network at about 70 F by a 500 gpm pump. Heating occurs as the oil passes through the shell of a 2-pass shell and tube heat exchanger. The hot ammonia discharge gas passes through the tubes en route to the ammonia condensers on the roof. A three-valve by-pass is provided in the ammonia line to permit inspection and repair of vessel without interruption to refrigeration system.

A single pass steam to oil heat exchanger supplies any additional heat required. A modulating steam valve is controlled by oil temperature leaving the steam-oil heater. During the first winter of operation oil temperatures were maintained without the use of auxiliary steam.

At design conditions the oil heating requirement is approximately 360,000 Btu/hr and the oil rise is approximately 3 F.

The underground heating system for the tenant building consists of an underground air duct system through which warm air is circulated. This duct system consists of both supply and return ducts located under the sub-floor. Air is heated by an industrial type finned coil forced air unit using low pressure steam from the boiler. In summer, warm outside air is circulated by the fan eliminating the need for steam.

An indicating thermometer in the engine room shows 45 ground-temperature readings from thermocouples going down to a depth of 9 ft below the warehouse. Thirty-five thermocouples are located below the main freezer building and 10 below the tenant building floors.

A second instrument records eight temperatures in the main freezer building and one temperature in each of the 12 rooms in the tenant building.

FDA Inspections of Public Refrigerated Warehouses

FROM time to time NARW receives inquiries regarding the authority of Food & Drug Administration inspectors, to enter and inspect public refrigerated warehouses without necessarily asking to inspect certain specific lots. NARW has gone into this matter thoroughly with FDA officials on several occasions and the following is FDA's interpretation of the law:

1 — The wording of section 704 (a) as amended gives FDA inspectors authority to enter any warehouse, public or private, at any reasonable time and to make an inspection.

2 — Inspectors may take any samples considered necessary and since the warehouseman is given a receipt for samples taken, he is in the clear as far as his customer is concerned. This authority has been upheld by a Supreme Court decision.

3 — If an inspector requests assistance of warehouse employees in taking samples, FDA will pay for these services. The inspector should have a voucher you can sign and submit for payment.

4 — The fact that the goods inspected or sampled are not in the hands of their owner is immaterial.

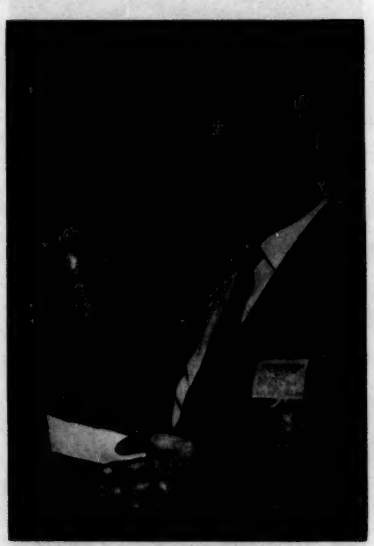
5 — FDA further interprets the law to give it authority to inspect goods in intra-state commerce on the grounds that they may be introduced into interstate commerce.—NARW Quick Sheet.

New Research Project

A GRANT of $5000 has been made by The Refrigeration Research Foundation to Rutgers University for research on the use of refrigeration to retain quality during storage of sterilized foods, under the direction of Dr. Olin Ball and Dr. Walter Maclinn of the Department of Food Technology. This research is a cooperative undertaking with the Eastern Utilization Research Branch, Agric. Research Administration, USDA, The Public Health Service and several canning equipment companies.—TRRF Bulletin.

Better Selling and Profit Planning Theme of Annual Warehouse Conventions

PROFIT planning was the theme of the 66th Annual Meeting of the American Warehousemen's Association held at Chalfonte-Haddon Hall, Atlantic City, New Jersey, April 1—5, 1957. However, the principal point made by each speaker and the various panelists assembled to guide and counsel warehousemen in their planning for profits, seemed to come up with the same answer; better selling and the importance of the individual to his own welfare.



Opening the 66th Annual Meeting is Millard W. Young, General President, AWA, National Ice & Cold Storage Co., San Francisco.

Opening with the AWA general session on Tuesday morning, both the Merchandising and the Refrigerated Warehouse Divisions, got right at one of the more important aspects of the annual meeting, that of labor problems within the industry. An impressive panel of industrial relations experts instructed the members of both divisions on what they should expect and what their rights were as employers, for the year 1957.

Following the joint session, presided over by Millard W. Young, San Francisco, General President of AWA, the Divisions of the Association then met on Tuesday afternoon, tackling their own particular division problems at separate sessions. Although each division met on Wednesday morning, a mid-week recess was taken on Wednesday afternoon when most all delegates and their guests made a choice of golf, boatride or boardwalk relaxation. Both divisions met separately on Thursday in closed session and wound up most division business on Friday morning, joining again for a general session shortly before the noon adjournment.

AWA Officers

President, R. M. King, Syracuse, N.Y.
Vice-President, Gilbert J. Stecker, Louisville, Ky.
Treasurer, Willard A. Morse, Minneapolis, Minn.
Secretary, William Dalton, Washington, D.C.

NARW Officers

President, S. A. Kadane, Dallas, Tex.
Vice-President, Philip G. Kuehn, Milwaukee, Wis.
Treasurer, John L. Bear, Wichita, Kans.
Executive Vice-President, William Dalton, Washington, D.C.

Opening Session AWA

Highlight of the opening general session was the activity of the employer's panel. The unique and rather new concept of plunging right into one of the major problems of the industry attracted a packed house attendance. The panel consisted of C. D. Johnston, Roanoke, Va., Fred A. Hartley, Washington, D.C., Joseph Moody, Washington, D.C., Philip G. Kuehn, Milwaukee, Wis., John K. Dozier, Houston, Texas.

The panel, eminently qualified to handle a discussion of this nature, presented views and certain specific data concerning the industrial relations problems facing the warehousing industry. Moderator Johnston introduced the discussion with a few appropriate remarks and then presented the Honorable Fred A. Hartley, former U.S. Congressman, who was co-author of the Taft-Hartley Management Relations Act. Mr. Hartley's remarks were limited generally to Section 14-B of the subject Act. He expressed an opinion that the objective of the labor movement is to destroy this section, in particularly the provisions which prohibited compulsory unionism, secondary boycott, feather-bedding, and mass picketing violence. He predicted specifically that strong efforts would be made to promote Federal Legislation which would outlaw the rights of the states to enact "Right to Work" laws.

In his presentation, Mr. Hartley

Chief executives of AWA confer prior to opening of 66th Annual Meeting. L. to r. M. W. Young, General President, C. A. LaMothe, Merchandise Div. President, and G. J. Stecker, Refrigerated Warehouse Div. retiring President.

Co-author of Taft-Hartley Labor Management Relations Act, Fred A. Hartley, former Congressman from New Jersey, addresses AWA general session. Other members of the employers panel are: Philip G. Kuehn, Milwaukee, Clem Johnston, Roanoke, Va., Joseph Moody, Pres., Southern Coal Producers, and John K. Dozier, Houston. Figures on the raised dias behind panel are General and Division Officers of AWA.

also brought out a comparison of welfare funds obtained from employers by union contract, as compared with the Federal act which provides social security. He pointed out that in 18 years of operation the social security funds have collected some 20 billion dollars from the American worker, whereas in only a little over nine years, unions have obtained some 32 billion dollars in welfare funds. This phase of his discussion, of course, prompted later comments on the probability of legislation which would curtail and tighten up the handling of such welfare funds.

NARW Opening Session

The speaker for the opening session of the Refrigerated Warehouse Division was George S. Jones, Managing Director of the Air Conditioning and Refrigeration Institute. Mr. Jones had addressed the refrigerated warehousemen three years previous, and returned at this time to report to the warehousemen on the growth of the refrigeration industry, which makes it one of the top dozen industries in the country today.

In his capacity as Managing Director of the Institute, Mr. Jones is recognized as one of the leading salesmen in the field. "As I see it," Mr. Jones said, "your customers are food growers, food handlers, hotels, restaurants, hospitals, chemical manufacturers, and florists to name a few—and an imposing list when we add up all the different things they might handle—and what do you have to offer? Some part at least of a long list that includes quick freezing, poultry dressing, meat curing, car icing, to say nothing of the basic job of receiving, storing and delivering."

At that point, the Institute's Director began to emphasize the fact that the refrigerated warehousing industry still has a considerable selling job to do. "Yes, you have many potential customers and you have to sell many services. Perhaps you can use some mass advertising—trade journals, etc."

S. A. Kadane, Pure Ice & Cold Storage Co., Dallas, Texas, new president National Association Refrigerated Warehouses

"As I have said, my experience in selling has largely been confined to consumer durables, but, after all, you don't sell the steel and plastic, the copper and aluminum that is a refrigerator, a range, an air conditioner. You sell the results—you sell the things your product will do for your prospect. And I think you have the same job. Sure, you must have a good product, the best of equipment, a good location, adequate facilities, but your most important asset is your organization—yourself.

"You must convince your prospect, and keep him convinced, of your ability as the management of that refrigerated warehouse. You must prove to your customers that their product is safe in your hands, that it will be properly handled, that orders will be promptly followed, that details will not be overlooked. You must prove to him that his goods will be taken care of as well or better than they can be handled by anybody."

Jones then presented some advice to the warehousemen which he indicated had been handed down to him by another nationally known figure in the selling profession. He related as how this great salesman in his time said that selling was as easy as A-B-C: A—make your customer like you; B—Know your stuff; C—You must work.

Clem D. Johnston, Past President, U.S. Chamber of Commerce and Past General President, AWA, moderates Employers Panel discussion on labor-management relations.

Geo. S. Jones, Jr., Executive Director, Air Conditioning & Refrigeration Institute, addresses the Refrigerated Warehouse Division on the mutual aspects of the business, today and in the future.

The speaker urged the warehousemen to win friends by being sincerely friendly. He told them to be neighborly, to be part of their town, to make it a point to be active in their church and clubs, and encourage their associates to do likewise. He indicated that the successful business man cannot be a success un-

less he is known and respected in his community.

Under the "B" classification, Jones elaborated by pointing out that the most important thing which any salesman can bring to a customer is the knowledge of the salesman's product, in this case a knowledge of the services that are available. Jones reminded the warehousemen that the report of the Director of The Refrigeration Research Foundation indicated that many warehousemen were not taking advantage of the research conducted by the Foundation in their behalf. He said, in his opinion, the research helped them know their stuff and gave them the necessary tools to bring the knowledge to the customer. "You must know a lot about a lot of things if you are to handle all of the products needing refrigeration that are used in your area," he told the warehousemen. In connection with the matter of hard work, Jones urged the representatives of the warehousemen's industry to acquire the habit of consistent and continuing solicitation. His definition of hard work boiled down to the description "creative selling" creating in the mind of the prospect the desire to buy the service offered.

Storage and Supply of Perishable Subsistence

A paper on the Storage and Supply of Perishable Subsistence by the Military Subsistence Supply Agency was presented by Major General H. R. McKenzie. There are ten market centers now, he explained, supplying all subsistence to all branches of the Department of Defense within the United States.

The commercial warehouse service plan which implemented numerous recommendations made by refrigerated warehouse members, he said, is being utilized for the commercial space required for all of the military services. The refrigerated storage operation is administered locally in each of the 10 Market Center areas under the staff supervision of the Chicago Office. There is available for the use of the Defense Department 275 active cold storage contracts in 41 states, of which 40 contracts in 16 states are currently being utilized for the storage and distribution of perishable subsistence.

The placement of these stocks is dependent upon the criteria of the lowest overall cost to the Government. Not only must the storage charges be compared but first and second-line haul costs from procurement origin to ultimate distribution destination must also be computed. The ability of the warehousing industry to provide the unusual temperature of 31.5 to 34.5 F and humidity conditions of 45 to 55 percent required for the reserve perishables storage program has been most gratifying, General McKenzie said.

The commercial storage costs excluding operational rations average about $2 million per year, or roughly 17 percent of the total operating cost. Annual storage costs for the refrigerated storage portion of operational rations are $750,000.

Major General Henry Ray McKenzie, Chicago, Executive Director, Military Subsistence Agency described the new look in U.S. Defense Dept. Supply.

General McKenzie concluded by assuring his audience that his office in Chicago is available at any time for questions or assistance to the industry.

Business Outlook

The Tuesday afternoon session was a series of concise statements from various areas in the United States on the business outlook for 1957. Chapter chairman or vice-chairman made each report.

A. W. Oakley, Jr., reported for the North Atlantic Chapter. He stated that the impact of private warehouse construction is being felt daily in their area although the outlook is slightly improved for 1957. The slight improvement he noted was forecast from increased seasonal activity expected. It also results from efforts of the warehouseman to provide more rapid turn-over of small quantities as an increased service to their customers. With few exceptions cooler storage demands have declined.

Report for the Great Lakes area was by W. J. Lamping. This report indicated a decrease in cooler occupancy of 10 percent for that region, as well as the decrease of 6 to 8 percent in freezer occupancy. He indicated that most members in that chapter were complaining of higher and higher operating costs while occupancy dipped as much as 50 percent. Private storage construction at production points is apparently the cause of the reduced occupancy.

The Missouri Valley Chapter report was handled by R. L. Smith. He indicated that the drought in the Southwest had a definite effect on occupancy in that area. He pointed out that the volume of meat business had fallen off recently with the packers selling their product direct and storing only the surplus. He forecast that there would be approximately the same amount of business in 1957 as in 1956 and reported that there were very few instances of added refrigerated space in that area.

Clyde Simmon reported for the Southwest Chapter in the absence of R. T. MacKenzie. He reported that the business outlook for 1957 would be slow. He predicted increased operating costs and those with private warehouse construction going on in their area would be most seriously hurt. This reporter judged private warehouse construction as an economic change which would come about anyway and concluded that the industry could only meet such competition as best they could. He indicated that some warehousemen in various areas of the chapter were seeking some relief through local tax exemptions for which they might be elegible due to the drought.

Charles Henry made a report for Virgil Weekley, secretary-treasurer of the Southeast Chapter. He reported that cooler occupancy was at 61 percent and freezer at 72 percent. The report indicated that these occupancies were higher than usual due to unusual production in the Southeastern area last year. Like other reports he indicated that private construction going on at a heavy rate in this area, both by private firms and cooperatives, was certainly hurting business. He indicated that labor problems however, were stable.

South Pacific business outlook was reported on by J. L. Urban. He indicated coolers were down in occupancy although the South Pacific has now become the second largest in the storage of eggs. Freezers, he indicated, were up at present and the outlook was good or even better than occupancy in 1956. Turkeys which would normally have moved out on tax day, March 1, did not move this year due to a depressed market

which accounted for freezer space being up at present. He indicated that there is considerable expansion of space in this area and suggested that warehousemen watch the drug industry for new business, and develop their own sales efforts with private firms and distributors who are considering their own warehouse facilities.

The North Pacific Chapter was reported on by Alex P. Olsson. The report indicated a 68 percent general overall occupancy. The slow decline of the previous year was due to peaches and cherries being off as a result of freezes early last year. The speaker indicated that occupancy was not of as great concern to the operators in the Pacific Northwest, as was their political situation. He indicated that unions were active in attempts to repeal "Right-to-Work" laws and engineers were active in their efforts to get a state license law passed in Oregon which would require an operating engineer for plants of 50-ton capacity and over. He indicated that union contracts were up for re-negotiation late in the Fall and that anticipated increases or demands were expected along with additional fringe benefits. The negotiations would apply to engineers, warehousemen and teamsters.

Selling Warehouse Service

Inspirational is the term that can properly be applied to an address by Dr. Kenneth McFarland, Educational Director, American Trucking Associations, Inc., Washington, D. C., who addressed the open session of NARW on Wednesday morning. Although the topic of Dr. McFarland's talk was "The Man in Salesman", he emphasized the importance to any sale was a constant selling job. He did not limit the selling aspect to the promotion of business in the form of service to a client. He pointed out that there was considerable selling needed in other spheres or activities of the refrigerated warehouse business. He expressed the opinion that perhaps not enough selling was done by various firms to their employees. It was his opinion that perhaps the unions were selling employees to a much better degree than business and that the business man should do a little concentrated selling of his business concern to the employees.

He suggested that the businessman capitalize the letter "U" in business. He indicated that that's the common denominator. The "U" in agriculture, in industry, in business, in education, is all the same. He showed that public relations, sales and manpower were all interwoven.

The speaker then proceeded to draw on certain data obtained from a study conducted by the Stanford University, which dealt with failures; failures of both "white collar" and "blue shirt" employees to hold their jobs. The Dr. startled some of his audience by stating that 93 percent of the firings in industry today are not related to aptitude. He stated that the results of the Stanford survey, which while continuing, nevertheless showed four factors to be most important in the failure series. The largest factor was laziness, while intemperance and immorality placed second and third. Disloyalty, however, was the fourth and perhaps the second in importance of the four.

An inspirational talk, conceded by many to be the best of the meeting, was given by Dr. Kenneth McFarland, Educational Director, American Trucking Associations, Inc., Washington, D.C.; His topic: The Man in Salesman.

Dr. MacFarland implied that laziness was probably poor judgment rather than the lack of health and energy concepts which build for success. He suggested that sales representatives in the industry leave the heavy drinking to their competitor and pointed out that every employee cannot have a policeman keep him on the straight and narrow path. Character is the individual's own best policeman, he said.

The speaker pointed out that the survey was confirming what a lot of businessmen suspected, that of a shortage of good old-fashioned loyalty. He pointed out that there is no fundamental conflict between unions and employers with regard to loyalty. A man can be loyal to an employer and still be loyal to his bargaining group.

The lecturer pointed out that industry has been prone to assume that their employees know what they as businessmen know. In a very graphic example he pointed out that no individual should assume anything. He emphasized that the boss has got to tell them; that is, sell his employees on their business.

He pointed out that 80 percent of the labor market today is engaged in their very first work in our economy. He indicated that at the present birthrate, the story of the part which business plays and the steady employment of all individuals, is the story that never gets told. The turnover of labor is such that one man can never tell the story completely to everyone coming within reach of his voice. It would be like lecturing to an endless parade.

Speaker McFarland pointed out that the truth is not self-evident in public relations and labor relations. He described a boat for his listeners and pointed out how ridiculous it would be for the crew to sink the officer's quarters on the presumption that they could get along without them and vice versa. He pointed out the truth that you cannot sink half a boat and emphasized for his listeners the fact that labor and management are in that same boat. He convinced his listeners that free enterprise is worthy of a better selling job than the business man is giving to his employees today. He urged that it practice respect for the dignity of the human personality and to sell the little man that big business is the friend of both the small business man and the small man, the employee.

Safety Awards

Concluding the open sessions on Wednesday morning were the reports of the various operational committees. The safety committee report was submitted by Jack Keefe of Bridgeton, New Jersey. Members receiving safety awards since the 1956 convention were:

One Year

American Ice & Cold Storage Company, Everett, Washington, Andrews Cold Storage Company, Inc., Prosser Wash., Boise Cold Storage Company, Ltd., Boise, Idaho, Central Storage & Warehouse Company, Madison, Wisconsin, Duluth Terminal & Cold Storage Company, Duluth, Minn.

Eastern Market Cold Storage Company, Detroit, Mich., Gotham Cold Storage Company, Inc., New York, N.Y., Greencastle Ice & Cold Storage, Inc., Greencastle, Pa., Haddon Ice & Coal Company, Haddonfield, N.J., Haslett Warehouse Company, San Francisco, Calif.

K & R Inc., Cold Storage, Hastings, Nebr., Kenyon Zero Storage, Grandview, Wash., Lyndonville Ice & Cold Storage Co., Lyndonville, N.Y., Madison County Cold Storage Company, Inc., Canastota, N.Y., Marionville Refrigerating Company, Marionville, Mo.

Labors plans for refrigerated warehousing were the topics for this panel discussion at the Wednesday session. Philip Kuehn (center) chairman of NARW's Industrial Relations Committee was moderator. Left to right: L. J. Urban, Los Angeles, W. W. Wilson, Brooklyn, P. V. Henningson, Portland, Ore., J. P. Johnson, New York City, Kuehn, John Dozier, Houston, H. W. Wilson, Philadelphia, H. M. Spradling, Carthage, Mo., Wm. Jobe, Jr., Washington, D.C.

Marshfield Cold Storage Company, Marshfield, Wis., Merchants Refrigeration Company, Buffalo, N.Y., Midwest Cold Storage Company, Green Bay, Wis., Milwaukee Cold Storage Company, Milwaukee, Wis., Mountain Ice & Coal Company, Pueblo, Colo.

National Ice & Cold Storage Company, Riverside, Calif., National Ice & Cold Storage Company, Watsonville, Calif., New England Cold Storage, Portland, Maine, Oshkosh Storage Company, Inc., Oshkosh, Wis., Patterson Cold Storage, Jacksonville, Fla.

Piedmont Cold Storage Corp., Charlotte, N.C., Port Everglades Refrigerating Company, Ft. Lauderdale, Fla., Puyallup Ice Company, Puyallup, Wash., Railways Ice & Service Company, Topeka, Kansas, Santa Clara Cold Storage & Freezer Co., Santa Clara, Calif.

Seattle Ice & Cold Storage, Seattle, Wash., The Sharon Ice & Coal Company, Farrell, Pa., Terminal Ice & Cold Storage Co., Nampa, Idaho, Terminal Ice & Cold Storage Co., Hillsboro, Oregon, Terminal Ice & Cold Storage Co., Salem, Oregon.

Union Ice Company, Mountain View, Calif., Union Ice & Storage Co., Santa Cruz, Calif., Union Storage Company of Erie, Erie, Pa., West's Ice & Cold Storage Co., Fond du Lac, Wis., York Cold Storage Company, York, Nebr.

Two Consecutive Years

Germantown Cold Storage Company, Inc., Germantown, N.Y., Merchants Cold Storage Company, Minneapolis, Minn., National Ice & Cold Storage Company, Oakland, Calif., National Ice & Cold Storage Company, Petaluma, Calif., National Ice & Cold Storage Company, Santa Rosa, Calif., Uptown Cold Storage Company, Inc., Rochester, N.Y.

Three Consecutive Years

Beall Refrigerating Company, Santa Clara, California, Hermitage Ice & Storage Company, Richmond, Virginia, National Ice Cold Storage Company, Stockton, Calif., North East Cold Storage Corporation, Portland, Maine, Union Ice & Storage Company, Chico, Calif.

Four Consecutive Years

Polar Cold Storage Company, Sioux Falls, S. Dak.

Committee Reports

The report on insurance was submitted by E. E. Hess of Chicago on behalf of the Insurance Committee. The committee urged greater participation in the group insurance plan.

The two divisions of the Refrigerated Warehouse Operations Committee reported, and were handled by V. C. Stevens of Dallas and P. B. Christensen of Portland, Maine. Sub-Committee Chairman Stevens included in his report some data on banks and banking, recommended to the delegates that they should participate in their local defense plans, and concluded with remarks that there had been some recent marked improvements in cold storage door manufacture which could now be extended to improvement of air locks.

Reporting for the construction, maintenance and repair division of the Warehouse Operations Committe, Paul Christensen announced that the committee would soon publish data sheets on floor patching, battery maintenance, and engine room operating costs.

Thursday's session was a closed affair. Select panelists discussed such items as labor's plan for refrigerating warehousing, a confidential survey on the changing times and three presentations on the profit picture.

President's Address

In his annual address NARW President G. J. Stecker went into retrospect by giving the delegates a short review of the history of refrigerated warehousing as a preliminary to study of the industry's present position and in planning for the future.

Not too long ago, he pointed out, apples were a commodity taking much space in public storage. When production area warehouses were built, this pattern was greatly changed. Shell eggs used to be a large percent of storage business. Due to year-round production of eggs, and eggs broken for freezer storage, case eggs are no longer a major item. Other commodities for storage have also changed. Grapes are now held largely at points of production. A "year round" program for marketing hogs has lowered the peak storage volume of pork. Frozen fruits and vegetables and orange concentrates have greatly reduced the amount of fresh commodities going into cooler storage. With each major change some of the industry has had less business but others have gone on to new and bigger business.

During the past ten or twelve years, as the frozen foods industry increased tremendously, the public storage industry rapidly converted from coolers to freezers and constructed additions and new warehouses to *provide* storage space for all customers. "Bear in mind, however", he advised, "that other changes were rapidly developing which required more than just *storage space*."

Now, a new pattern of production and distribution of food has developed similar to that of many other large industries notably that automobile industry. During the past 60 years over 1200 car companies have been in existence. Today five companies build nearly all our cars. Similarly, chain grocers are merging. Large super markets are replacing small stores and individual grocers. This development of big business in food distribution creates more direct buying, direct selling and direct shipments to central distribution points. This tends to eliminate small packers, brokers, distributors, some public warehouse operations and retail stores."

According to Stecker, a number of basic factors recently contributed to the development of "Big Business" in food distribution: 1. Tremendous increase in population of large cities and the development of suburban areas; 2. Crowded condition of streets creating traffic problems of parking and increased cost of trucking, for some areas; 3. Strong labor unions with higher cost of labor at all stages for producing, transporting and handling of food; 4. Abundance of low-interest money, available to large companies. Thus while public warehousing provided storage space for all commodities, other factors have developed, largely factors over which they had no control.

This change in warehousing that is taking place is only one of the many changes being made in distribution and marketing, and it applies to merchandise as well as to refrigerated warehouses. It is an economic change very similar to the change from rail-

road to truck, from railroad to pipeline, from steam locomotive to diesel locomotive, from ice to mechanical refrigeration in the home, etc.

But we know that many progressive warehouses have adopted their facilities to handle frozen food efficiently, thus getting new customers. I believe, he continued, we should be optimistic about the public refrigerated storage business. Collectively, we did a tremendous volume of business last year. We should keep in mind that we handle a large variety of products in our warehouses. While we cannot keep all of the retail frozen food business, we know that this part of frozen foods will continue to grow and expand. There will continue to be a big place for us in this picture.

Mr. Stecker reminded the delegates that as they plan for the future, their best hope for continued success is presented by cooperation through membership in the National Association. By working together, he pointed out, they can best accomplish their goals. Furthermore, just as many other industries support research in their fields, he urged that they should all support The Refrigeration Research Foundation. Research can be the basis for ever-increasing new business, he said. We must face our problems with sound plans and a strong determination to protect our business. With this kind of determination, our industry can and will continue to grow and serve well our country, he concluded.

Executive Vice-President Reports

Executive Vice-President Wm. Dalton in his annual report pointed out that his job there was to tell the members of the industry that all is not lost; that public refrigerated warehousing it still going places; refrigerated warehousemen still occupy the front and center spot in America's dynamic food economy, and that they are still the keystone of America's distribution system.

During the three years from 1953 to 1956 Dalton pointed out, many new warehouses have come into operation but they've not NARW warehouses, they are privately or cooperately owned.

One of our first economic facts of life might be something like this, he said: The key to packer and distributor profit is turnover. Turnover is available every day in public warehouses without retarding and hamstringing customer investment in facilities that are not profitable.

For another economic factor or two, he asked: How many private warehouse owners do you know who utilize all of their space? Who base their cost factors on 12 months' occupancy? Who build adequately, and therefore economically, so that all of these factors may be considered realistically?

First, the NARW executive suggested: take a look at some of the convenience factors that you offer your customer, or at least most of you do every day:

(1) You provide him more operating capital.

(2) You give him your own A-No.-1 — top-level — scientifically controlled, super and highly specialized brand of product protection; *Expert* product protection, if you please!

(3) You give him nationwide service, and if he doesn't want that product where you are, and if you can't sell him on the merits of your location, then you can locate that nationwide service for him through the use of the NARW Directory of Public Refrigeration Warehouses, the 1957 Edition of which has just rolled off the presses.

(4) You give him fewer personnel headaches and greater man-hour production.

(5) You give him accessability to all kinds of transportation.

(6) You even give him money or, at least, some of you do.

(7) And look at the extra services you give him —or most of you do: Quick Freezing Facilities; Break-up Rooms; Office Rental; and all the others.

(8) Finally, and this is the most ridiculous give-away of all, you are giving him a faster moving, streamlined, high pressure (on you, that is) 1957 brand of service at pre-war prices.

But as President Stecker pointed out Dalton stated, times are changing — they are changing in the public storage business just like they are in every other business. He said he supposes the only kind of a business that would be a perpetual utopia, though, would be one where you could find something that cost you a dime, sell it for a dollar, and make it habit-forming. But — that *would* be utopia.

I submit, Mr. Dalton concluded, that we should evaluate carefully what we have to offer, possibly make it a lot better than it has ever been before, and then get out and shout about it from the housetops, *but know to whom you are shouting*, and how loud he likes it, because you see there's where your market is and that's the ultimate and final challenge.

The business concluded on Friday morning with another panel discussion on getting costs down, followed by report of the Resolutions Committee and the installation of new officers.

First Timers Breakfast

Members of the National Association of Refrigerated Warehouses attending their first convention were feted at a "First-Timers' " Breakfast in the Peacock Inn of Haddon Hall Tuesday, April 2. Highlighting the program was an address, "You, Unlimited" by Glenn B. Sanborg, executive vice-president of the American Society of Association Executives. The "First-Timers' "Breakfast is a special annual NARW event at which industry members attending their first convention are honored by public refrigerated warehousemen.

New Officers Elected

Officers elected and installed for the Refrigerated Warehouse Division AWA are:

President: S. A. Kadane, Pure Ice & Cold Storage Co., Dallas, Texas.

Vice-President: Philip G. Kuehn, Wisconsin Cold Storage Co., Milwaukee, Wisconsin.

Treasurer: John L. Bear, Kansas Cold Storage, Inc., Wichita, Kansas.

New members elected to NARW's Executive Committee were: W. C. Baker, Produce Terminal Cold Storage Co., Chicago, Ill.; C. A. Bowen, Jr., Noel & Company, Inc., Nashville, Tenn.; A. R. Carstensen, Crystal Ice & Cold Storage Co., Sacramento, Calif.; and Garth A. Shoemaker, Hygeia Refrigerating Co., Elmira, New York. NARW officers are elected for a one-year term. Executive Committee members serve for three years.

AWA General officers elected and installed were:

General President: Raymond M. King, King Storage Warehouse Inc., Syracuse, N. Y.

General Vice-President: Gilbert J. Stecker, Merchants Ice and Cold Storage Co., Louisville, Ky.

General Treasurer: W. A. Morse, Security Warehouse Co., Minneapolis, Minn.

William Dalton continues as General Secretary, AWA. and Executive Vice-President, NARW.

Associate Members Exhibit

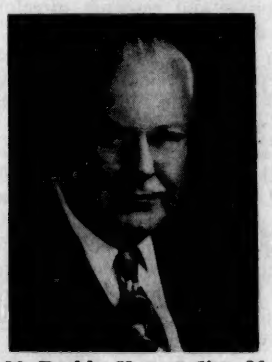
A number of NARW associate members again this year displayed their products in an exhibit on the lounge floor of Haddon Hall Hotel. Sales and engineering representatives were in attendance in the individual booths.

Technical Progress Reported at Meeting of Refrigeration Research Foundation

LEADERS in The Refrigeration Research Foundation stressed two correlated facts — that large opportunities for advancement in commodity refrigeration lie ahead and that lag in adoption of new technical development may become a serious source of danger — during the Foundation's annual meetings March 30 to April 2 in Atlantic City.

Garth Shoemaker, Elmira, N.Y., President, T R R F

Harlan J. Nissen, retiring president who has served two years, called attention to the contributions of the 60 major and numerous minor research projects that the Foundation has sponsored and aided since January, 1944, when it was established by a group of refrigerated warehousing companies. He said emphatically that support of the Foundation enables the industry to assume responsibility for its own technical advancement and thus the industry realizes more fully its position as a public trust.



E. M. Dodds, Kansas City, Mo., Vice-president T R R F

Activities in line with this position of public trust, mentioned by Pres. Nissen, include the Samuel Cate Prescott Fellowship for advanced study in food refrigeration and the Honorary Membership for men with distinguished careers in refrigeration research. During the past year Dr. Rudolf Plank of Karlsruhe, Germany, was selected as first honorary member of the Foundation. The second award of the Samuel Cate Prescott Fellowship was made at the meeting to Sam R. Cecil of Georgia Agricultural Experiment Station for research on refrigeration of filberts at Oregon State College.

The greatest present need, according to President Nissen, is more intensified industrial development and adoption of the new technical findings that the Foundation's activities uncover. Steps were discussed and will be taken, under the leadership of the newly elected president, Garth, A. Shoemaker of Elmira, N. Y., toward meeting this need. One will be the development of additional cost-and-profit information on new and advanced technical operations. Investigations to supply such information are commonly called "operations research" — a type of research that is relatively new but is pursued in a number of research agencies and corporations.

Similarly aimed is an award of $100 to be granted annually to the

Officers and Board of Governors TRRF 1957

Dr. Samuel C. Prescott, Chairman of Board
Dr. Wm. A. Schoenfeld, Assoc. Chairman
Garth A. Shoemaker, President
E. M. Dodds, Vice-President
Gilbert J. Stecker, Treasurer-Asst. Secretary
H. C. Diehl, Secretary and Director

Executive Committee

Garth A. Shoemaker, Chairman (ex officio), Elmira, N.Y.
E. M. Dodds, Kansas City, Mo.
C. A. Bowen, Jr., Nashville, Tenn.
Gilbert J. Stecker, Louisville, Ky.
Paul D. Burrill, Boston
Stanley J. Hoffberger, Washington, D.C.
Sheffield A. Kadane, Dallas
J. W. Straub, New York City
Harlan J. Nissen, Los Angeles

Board of Governors Representing the Public

Dr. Samuel C. Prescott, Emeritus Dean of Science, Massachusetts Institute of Technology, Cambridge, Mass., Chairman of the Board.
Dr. Laurence V. Burton, Packaging Consultant, Scarsdale, N.Y.
Edwin T. Gibson, Eisenhower Exchange Fellowships, Inc., New York.
Dr. Louis B. Howard, Director and Dean, Illinois Agricultural Experiment Station, University of Illinois, Urbana, Ill.
Col. Paul P. Logan, Director of Food Research, National Restaurant Association, Chicago, Ill.
Dr. Harry J. Reed, Director and Dean, Indiana Agricultural Experiment Station, Purdue University, Lafayette, Indiana.
Dr. William A. Schoenfeld, Emeritus Dean and Director, Oregon Agricultural Experiment Station, Oregon State College, Corvallis, Oregon.

Term Expiring 1958

Curtis F. Lewis, Cincinnati, Ohio.
James H. Kuehn, Milwaukee, Wisc.
Clyde E. Simmon, Oklahoma City, Okla.
William A. Sizer, Chicago, Ill.
Gilbert J. Stecker, Louisville, Ky.
Horace W. Wilson, Philadelphia, Pa.
Millard W. Young, San Francisco, Calif.

Term Expiring 1959

C. A. Bowen, Jr., Nashville, Tenn.
Jules L. Gagini, Omaha, Nebr.
J. R. Goodfellow, Seattle, Wash.
Stanley C. Hoffberger, Baltimore, Md.
William E. Martin, Vancouver, B.C., Canada.
Harlan J. Nissen, Los Angeles, Calif.
Garth A. Shoemaker, Elmira, New York.

Term Expiring 1960

S. A. Kadane, Dallas, Texas.
E. M. Dodds, Kansas City, Mo.
John L. Bear, Wichita, Kans.
P. D. Burrill, Boston, Mass.
C. A. Martin, Jr., Nashville, Tenn.
Jas. C. Rear, San Francisco, Calif.
J. W. Straub, New York, N.Y.

member of the refrigerated warehousing industry who submits the best report on how new technical knowledge has been applied profitably in a cold-storage operation. The donor of this award will remain anonymous and details with regard to eligibility, time, and exact nature of the report will be publicized later. It is planned that the award will extend over a period of ten years and that younger industry members will be encouraged to compete.

Further training conferences and continuance of other informational activity of the Foundation were also agreed upon. The Foundation's Board of Governors, Executive Committee, and membership all met in separate sessions and discussed past and future activities during the week end in Atlantic City, just prior to meetings of the National Association of Refrigerated Warehouses and American Warehousemen's Association.

Report From Diehl

H. C. Diehl, Director and Secretary of the Foundation, pointed out that refrigerated warehousing is in a period of re-evaluation and change — similar to the period of the early 1930's when frozen foods first became an industrial reality. Research, he said, is necessary and the Foundation must aid the industry in meeting the present challenge of expansion of frozen foods. It must not only maintain a stream of new technical facts but must engage in studies on the economic significance of new technical developments. This kind of research, he said, is called operations research and it is meeting the needs of the present. He also called attention to the Foundation's position as a member of the national committee that represents the United States in the International Institute of Refrigeration.

At four meetings held on Saturday, March 30 and Monday, April 1, the Scientific Advisory Council, a group of 20 scientists known for their prominence in the field of refrigeration and serving the Foundation without compensation, reviewed 29 active research projects sponsored in 1956. The Council also met at dinner on Saturday evening.

Membership Meeting

On Sunday, March 31, the Foundation membership met, when they heard addresses by Chairman Dr. S. C. Prescott, Cambridge, Mass., and President Harlan J. Nissen, Los Angeles, followed by reports from the assistant treasurer, Mack A. Hunt, Chicago, and the Research Director, H. C. ("Dutch") Diehl, Colorado Springs.

Research Foundation Director, H. C. (Dutch) Diehl emerges from an NARW exhibitors inspection tour. Diehl is at right. Left is C. N. Broaddus, Harrisonburg, Va.

Dr. Samuel C. Prescott, Chairman of the Board of Governors, reviewed the 15-year history of the Foundation and said that as a result of its growth and accumulation of experience it is capable of undertaking very large problems with nationwide breadth and significance. It has grown from smaller to larger achievements, he said, and has demonstrated the principle that "Every end means a new beginning."

Gilbert J. Stecker, treasurer, and Mack A. Hunt, assistant treasurer, reported that the Foundation's financial position is the strongest in its history. Income from subscriptions and investments has increased substantially during the past year.

In addition, because of special interest in the subject, W. B. Esselen, Jr., of Massachusetts Experiment Station at Amherst reviewed research on immersion freezing of poultry. Because of its promise as a fast and efficient method, there is intense interest in this subject, and Dr. Esselen's report stimulated thorough discussion of technical problems, some of which will require additional investigation and industrial development. Reports were made on freezing of bakery products by J. W. Pence of USDA's Western Utilization Research Laboratory in Albany, Calif.; on frosting of coils by W. F. Stoecker of University of Illinois in Urbana; on low doses of radiation and refrigeration to preserve eviscerated chicken and on enthalpy of foods by Marvin Steinberg of University of Illinois; and on instrumentation for the measurement of low-temperature humidity by W. J. Superior of Drexel Institute.

New Officers

New officers elected were Garth A. Shoemaker, President; E. M. Dodds, Vice President; and Dr. William A. Schoenfeld, Associate Chairman of the Board of Governors. The latter is a new position. All other officers — Dr. S. C. Prescott as Chairman of the Board, Gilbert J. Stecker as Treasurer, and H. C. Diehl as Director and Secretary — were re-elected.

New industry members of the Board, with terms expiring in 1960, are John L. Bear, P. D. Burrill, E. M. Dodds, S. A. Kadane, C. A. Martin Jr., James C. Rear, and J. W. Straub. Frank L. Lockwood was elected to fill a vacany in the group whose terms expire in 1959 and Curtis F. Lewis to fill a vacancy in the 1958 group.

The Executive Committee for the coming year will be Garth A. Shoemaker (Chairman *ex officio*), C. A. Bowen Jr., P. D. Burrill, E. M. Dodds, Stanley C. Hoffberger, S. A. Kadane, Harlan J. Nissen, Gilbert J. Stecker, and J. W. Straub.

Scientific Advisory Council Annual Meeting

A broadening vista of progress in commodity refrigeration through research based directly on industrial needs opened up as the Refrigeration Research Foundation's Scientific Advisory Council discussed present and future developments in Atlantic City in the two full-day sessions March 30 and April 1.

The Council is composed of 21 scientists and research directors selected from varied fields, and from both industrial and governmental or independent research organizations. Here are some of the highlights of the meeting:

Temperature tolerance research, similar to the comprehensive project in USDA's Western Utilization Research Laboratory in Albany, Calif., is needed for many commodities in addition to frozen fruits, vegetables, and poultry, which the western laboratory is investigating, according to many present. The results of that project are gaining wide industrial attention, and action on application of the data is under way. It is widely believed that the frozen-food handling industries can contribute to continued expansion of markets through greater guarantee of top quality that is possible with accurate knowledge of relationships of temperature experience to quality factors such as flavor, color, texture, and vitamin content.

Discussions by industrial and re-

search men present suggested a need for additional information on temperature as related to quality change in pallet loads and cases, in addition to individual packages. Another need is information on the economic value of lowering temperature well below zero in warehouses prior to distribution, and many similar needs for economic information were considered. As a result of extensive discussions of operations research, which is directed toward cost-and-value interpretations, the Foundation plans to move further in that direction and to initiate work of that kind, particularly as an aid to management in reaching decisions on adoption of practices.

Packaging came in for a large share of discussion. There is continued need for fuller understanding of the comparative values of the many new types and kinds of packaging. Undoubtedly much loss is experienced from use of packaging that is not appropriate for the purpose intended. No large developments are foreseen in such fields as radiation and use of antibiotics — beyond developments of the present. The constant danger, exemplifiied in many ways in the discussions, is that careless use of inappropriate "substitutes" for refrigeration and sanitation may develop.

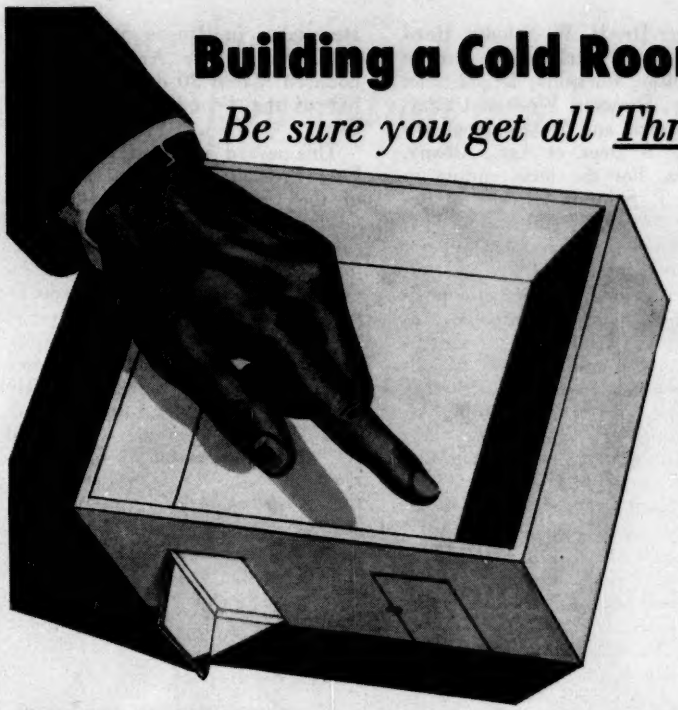
All commodity industries have problems and all are making progress, and these matters were reviewed in detail — with several suggestions for new research that the Foundation may undertake. Engineering problems considered included condensation, frosting of coils, enthalpy of foods, the new process of freeze drying in which the Armed Forces is especially interested, and immersion freezing of poultry. The latter is a matter of special current interest.

Council Enlarged

Director H. C. Diehl announced that by action of the Executive Committee, the Council has been increased to 21 members, from the previous 20, and that each year seven will be elected for a 3-year term. Those elected for a term ending in 1960 are as follows: A. C. Beardsell, President of Container Laboratories, Inc., New York City; Dr. E. A. Fieger, Head of Dept. of Agricultural Chemistry, Louisiana State University, Baton Rouge; Dr. E. P. Christopher, Asst. Dean and Head of Dept. of Horticulture, Rhode Island State College, Kingston; C. K. Wiesman, Mgr. Research Dept., Armour & Co., Chicago; Edward Simons, Consulting Engineer, San

Building a Cold Room?

Be sure you get all Three



1. THE RIGHT MATERIAL—UNITED'S B. B. (block-baked) CORKBOARD

No fillers—no binders—low "K" factor—easy to install—strong—lightweight—flexible. Bonds readily—works as easily as lumber.

2. THE CORRECT DESIGN—UNITED'S DESIGN SERVICE

Our engineers are trained insulation experts—available to consult, design and specify complete installations of insulation for practically every job condition and to your specifications.

3. THE PROPER INSTALLATION—UNITED'S INSTALLATION SERVICE

Our skilled erection crews, located at each of our branch offices can handle your complete installation. Avoid delays and improper applications of insulation by using United's experienced design and installation service.

United Cork Companies' have 50 years of experience and leadership in serving the requirements of the refrigeration industry with a quality product. If you have a low temperature insulation problem, use the coupon below for additional product information and installation data. Your United representative will be glad to advise you.

Corkboard

Pipe Covering

Tank Lagging

UNITED BB CORKBOARD

Manufacturers and erectors of cork insulation for almost a half century

UNITED CORK COMPANIES
4 Central Ave., Kearny, New Jersey

UNITED CORK COMPANIES , 4 Central Ave., Kearny, N.J.
Please send United Cork Catalog. I am interested in
_____
NAME _____
FIRM _____
ADDRESS _____
CITY _____ ZONE ____ STATE _____

Engineering and installation offices, or approved distributors, in key cities—coast to coast.

Francisco; Dr. H. W. Schultz, Head Dept. of Food Technology, Oregon State College, Corvallis; Dr. Michael J. Copley, Director, Western Utilization Research and Development Division, U. S. Dept. of Agr., Albany, California. For the term ending in 1958, H. P. Schmitt, Director of Research, National Association of Frozen Food Packers, Washington, D.C., was appointed.

Other Council members and project leaders who participated included Prof. Carl F. Kayan, Columbia University, and Dr. J. G. Woodroof, Georgia Experiment Station (condensation); E. F. Jansen, Albany, Calif. (temperature tolerance); Dr. B. E. Proctor of MIT; O. C. Young, Fisheries Research Board, Canada; Dr. D. K. Tressler, QM Food and Container Institute, Chicago; Dr. G. F. Stewart, Dept. of Poultry, Univ. California at Davis; Marvin Steinberg, University of Illinois, Urbana (radiation); Dr. W. H. Cook, National Research Council, Canada; Dr. W. B. Esselen Jr., University of Massachusetts, Amherst (immersion freezing); Dr. C. G. North, Beatrice Foods Co., Chicago (dairy products); Burgess Jennings, Chm. Dept. Mechanical Engineering, Northwestern University; Dr. C. O. Ball, Rutgers University, New Brunswick, N.J., (new project on storage of sterilized foods); Charles Butler, U. S. Fish & Wildlife Service, Washington D. C.; Wm. Sulzbacher, USDA (meats); W. T. Pentzer, USDA (fruits, vegetables, florists' stocks); Dr. John Atkin, Cornell University (bitterness in stored carrots); Dr. Milton Workman, Purdue University, Ind. (atmosphere control).

Other Council members include: Dr. Cliff D. Carpenter, Institute of American Poultry Industries, Chicago, Dr. Michael J. Copley, Chief Western Utilization Research Branch, U. S. Dept. of Agriculture, Albany, Calif., Dr. Roy C. Newton, Swift & Company, Chicago, Illinois, Dr. C. G. North, Beatrice Foods Co., Chicago, Ill., Dr. Walter V. Price, University of Wisconsin, Madison, Wis. and Dr. H. P. Schmitt, National Association of Frozen Food Packers, Washington, D.C.

Second Fellowship Awarded

Sam R. Cecil, Food Technologist in the Georgia Agricultural Experiment Station, Experiment, Ga., won the second fellowship for graduate study that the Refrigeration Research Foundation has awarded. Mr. Cecil is on leave from his duties in Georgia and is engaged in graduate studies in Oregon State College in Corvallis. The Award was announced March 30 during the meeting of the Foundation in Atlantic City.

This award is called the Samuel Cate Prescott Fellowship, in honor of the Chairman of the Board of Governors of the Foundation. The first award, granted a year ago, went to Lawrence S. Spiegel, who is engaged during the current academic year at Massachusetts Institute of Technology in studies on processing methods that will enable Air Force in-flight menu foods to be held safely for periods longer than now allowed.

In Oregon State College Mr. Cecil is conducting research on in-shell filberts and on raw and processed filbert kernels held at various temperatures. He is a candidate for the doctorate degree and the fellowship stipend of $2500 will be used next year to pay academic expenses such as tuition and incidental costs.

Director's Report

As customary, the Director of the Foundation submitted a printed, detailed report of the year's activities just concluded, printed copies of which are available from the Foundation office. In his report on Sunday, March 31, Director Diehl highlighted the major items in a brief address. In his introduction he commented on the estimated total being spent by U. S. industries on research. He stated that four billion is spent privately, with six billion by Government, bringing the research investments to better than one percent of our gross national product.

Dr. Diehl dwelt briefly but emphatically on trends. An economic study recently completed by the State University of Iowa is quoted in his report which not only demonstrates the need for research programs but well justified the interest and investments of the American warehousing industry to date. The report took cognizance of the trend to frozen foods, to the exclusion of other forms of preservation for fruits and vegetables. The reference report, in part, read as follows: "Regions which produce fruits or vegetables should probably no longer seek to establish canneries; rather their best efforts might be directed toward attracting processing plants for quick freezing the produce, or manufacturing concentrates."

In addition to citing those trends which affect commodity refrigeration and which require continuing or new research, the Director indicated that the Foundation's research serves often as a stabilizer, and when applied in a practical manner can even create favorable trends for the industry. In particular he referred to the present trend in merchandising toward "direct buying". The trend presents a problem which may disrupt the present pattern of warehouse operations.

"Unquestionably application of The Refrigeration Research Foundation findings can contribute to counter action of difficulties that may arise from very large development of direct buying", said Diehl. "Emphasis must be placed on application of the knowledge. The need is great not only for accurate information but for effective industrial use of the information. He expressed regret that more of refrigerated warehousing industry had not seen fit to use the sales tools provided by the researchers.

The Director dwelt heavily on the importance of creativeness as well as practical application through use of technical information within the individual companies. "The modern warehousing concept", his report stated, "is one of sustaining and expediting the merchandising of commodities — not one of merely stockpiling in refrigerated space for out-of-season use or speculative selling. Obviously, space is needed but a too rigid adherence to space concepts will serve no useful purpose today.

"Function and service are emphasized", the Director noted. "These two essential components rest, squarely on professional ability to serve, supported by technical knowledge gained from consistently sustained research, and on business acumen, ethics, personal integrity, and cooperation."

The report summarized the progress made on a limited number of projects and activities. Appended to the report was a list of the publications, and grants-in-aid to research by the Foundation. The appendix also contained a roster of sustaining and associate members.

In the progress summary, the director highlighted projects on frozen foods, food refrigerated but not frozen, basic engineering and storage management, abstracting research and information service, short-term investigations, the Samuel Cate Prescott Fellowship, and collaboration with government and allied industry.

Citied as examples of successful research projects which not only obtained data sought for overcoming a specific problem, but resulted in major contributions to their own immediate industries, were the Gulf Shrimp Study and the Time-Temperature Tolerance Studies on Frozen Foods.

Take a tip from those who know refrigeration best!

A. A. Silverman, President
The Vilter Manufacturing Company

"Trouble-free operation of your refrigeration system requires highest purity ammonia.

"Our customers can't afford a plant shutdown or even a slowdown. That's why we charge all new installations with ammonia of the highest purity.

"We advise our customers to continue this care. Old and new refrigeration systems must be kept free of oil, non-condensable gases, water, air—foreign matter usually found in inferior grades of ammonia.

"Always insist on the highest purity ammonia. You'll find it always pays."

Do as so many leading manufacturers of refrigeration equipment do. Use only Armour 99.98% pure ammonia. It's extremely dry and free from all oil and non-condensable gases. Best of all—Armour has 167 cylinder stockpoints from coast-to-coast and 7 strategically located bulk stations—*more than any other manufacturer!* That's why those who know refrigeration best call on Armour for dependable, fast service.

ARMOUR *Ammonia Division*

SEND FOR FREE AMMONIA DETECTORS!

ARMOUR AND COMPANY R5
1355 West 31st Street, Chicago 9, Illinois

- ☐ Send me *FREE* Sulphur Tapers and sensitive Test Papers for detecting ammonia leaks.
- ☐ Send me further information on Armour High Purity Ammonia.
- ☐ Have an Armour Ammonia representative call on me.

NAME _____ TITLE _____

FIRM _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Advisory Group on Refrigerated and Frozen Foods Urges Expanded Research

A RESEARCH program aimed at helping to provide consumers with the best possible frozen and cold storage products was urged by the U.S. Department of Agriculture's Refrigerated and Frozen Products Research Advisory Committee, at its annual meeting in Washington, D.C., January 14-16. Maintenance of quality—from the field to finished consumer product—through development of superior equipment and techniques is stressed throughout the broad research program urged by the group.

The committee outlined the following specific areas in which new or expanded research by the Department is needed:

Areas of Research

Product Quality and Nutritive Quality: Expand studies to develop new or improved methods and instruments for objective measurement of quality of raw and processed products that are refrigerated or frozen. Increase basic research on the composition of fruits, vegetables, and their products in relation to processing quality. Expand studies on how to retain "fresh cooked" flavor in precooked frozen poultry.

Environmental Requirements: Increase research on time-temperature tolerance studies of frozen foods, including vegetables, fruit, eggs, poultry and animal products. Expand research on the effects of fluctuating temperatures on fresh fruits and vegetables. Widen work on frozen bakery products.

Container and Package Development: Increase present work, and initiate new research, on packaging requirements of frozen foods and other processed foods. Expand research to improve shipping containers by developing basic design data for construction of various size containers. Widen work on performance of fiberboard containers, including laminated, impregnated, and coated fiberboards.

Shrinkage or Spoilage Factors: Initiate new research on quality and safety in household handling of frozen foods. Increase research on control of postharvest diseases in fresh fruits and vegetables. Begin additional research on chemical and microbiological factors of frozen precooked meats and meat products.

Equipment and Facilities: Expand basic studies of refrigerated motor-truck trailers to develop dependable standards of performance of new and used vehicles. Increase research to determine best conditions for freezing fruit, vegetable and poultry products. Expand research to develop best procedures and equipment for freezing bakery products.

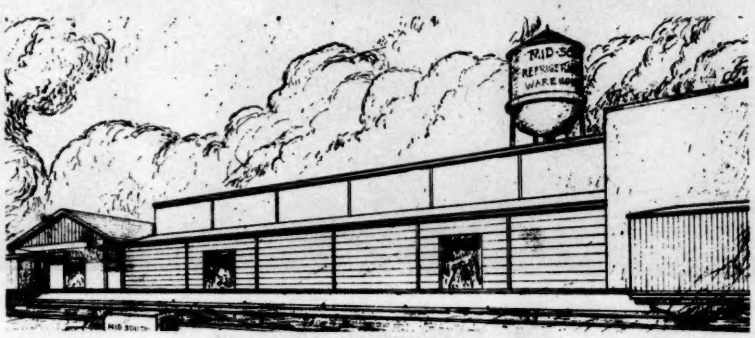
New and improved frozen food products: Expand research to provide fundamental and technological information needed to develop new prepared frozen foods and to improve quality and stability. Initiate new research on citrus juice concentrates from Florida fruits. Begin research to develop new meat products, including new cured meat products.

Economic Studies: Initiate research on utilization of locker plant byproducts. Initiate a survey of environmental temperature conditions during distribution of frozen products from processors to consumers. Review developments in the field of radiation sterilization and antibiotics to provide a basis for future studies if these new food preservation methods reach the state of economic feasibility.

Education and Other Services: Improve cold storage statistical reporting program. It was recommended that a study be initiated to obtain information from warehousemen on problems they face in preparing reports for the Department's Cold Storage Report. The committee, established under the Research and Marketing Act of 1946, is submitting a detailed report of its recommendations to the Department.

Paul B. Christensen, manager, North East Cold Storage Corporation, Portland, Maine, was reelected chairman of the committee. H. C. Diehl, director, Refrigeration Research Foundation, Colorado Springs, Colo., was reelected vice-chairman.

Warehouse Plans to Add New Freezer Space



Drawing of new freezer addition to Mid-South Refrigerated Warehouse Company, Memphis, Tenn.

THE MID-SOUTH Refrigerated Warehouse Co. Memphis, Tenn., has announced it is starting the construction of 250,000 cubic feet of additional freezer space, adjacent to its present plant at 100 East Parkway South.

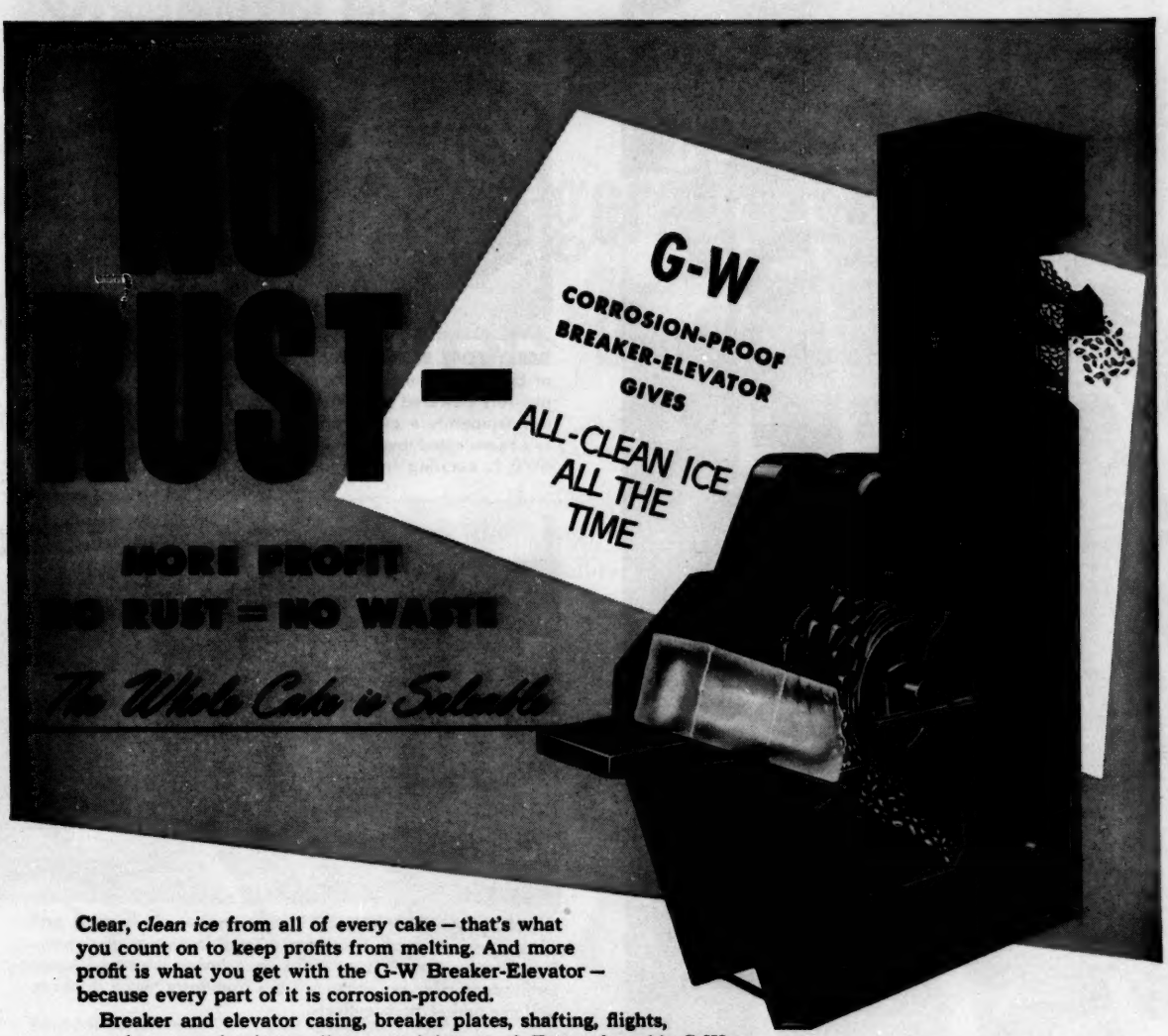
The new freezer space also will be adjacent to the processing plant, already on the property, which is equipped to handle the processing of fruits and vegetables produced in the Memphis area.

The increased freezer space is being made available to keep in step with the expanding production by growers of fruits and vegetables on acreage displaced by shrinking cotton allotments.

"Processing periods," the company statement said, "usually bring on congested peaks for freezing and storage of the product immediately as harvested, and due to weather hazards it is not always possible to correctly anticipate the freezer space needed. This poses a real problem with the vegetable and berry processors, and the making available of this added facility will be of great interest to these processors." The addition also is designed so that the plant can better fit into the freezing storage program of meat packers in the Memphis area.

In addition to the Mid-South company expansion, Memphis Cold Storage Warehouse Co., under the same management, has just completed converting two million cubic feet of 32-degree cooler space into freezer space to take care of increased use of frozen foods in the territory.

William W. Goodman is company president; T. E. McCrary vice-president and general manager; Charles Conley chief engineer; and Alvis J. Clay assistant chief engineer.



Clear, *clean ice* from all of every cake – that's what you count on to keep profits from melting. And more profit is what you get with the G-W Breaker-Elevator – because every part of it is corrosion-proofed.

Breaker and elevator casing, breaker plates, shafting, flights, sprockets are aluminum alloy or stainless steel. Even after this G-W Breaker has been standing idle, ice particles emerge rust-free and usable.

Corrosion-proofing isn't the only feature of the G-W Breaker-Elevator that was planned with your profit in mind. Snow ice and fines are reduced to a minimum because the *curved picks* strike the cake at right angles, imitating the slicing feed action of hand shaving. Particles are passed without additional crushing through the *comb plate* because the *breaker drum* is ribbed. Flow is steady, discharge is even because drop is minimized and *elevator flights* are close-spaced. A single motor drives both breaker and elevator.

Stop profit-loss where it can be biggest – in your ice breaker. Any G-W representative can tell you about this new profit-building, corrosion-proof breaker, and recommend a unit size to fit your exact needs.

GIFFORD-WOOD CO.

Hudson, N. Y.

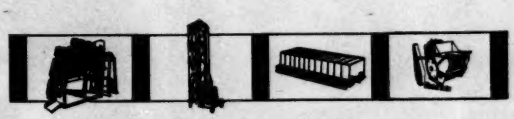
1447

420 Lexington Ave., New York 17, N. Y. • 3537 Lee Road, Cleveland 20, Ohio
Railway Exchange Bldg., St. Louis 1, Mo. • 565 W. Washington St., Chicago 6, Ill.

Pacific Coast Representative: WESTERN ICE EQUIPMENT CO., 420 Market St., San Francisco 11, Calif.

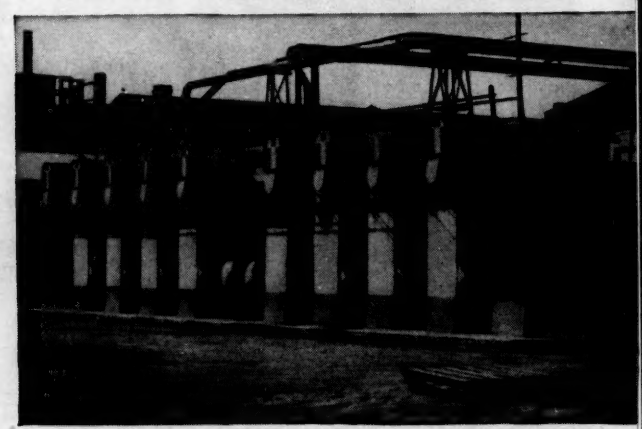
SPECIFICATIONS

BREAKER	ELEVATOR
Stainless Clad Steel Plates	Aluminum Alloy Casing
Metallized Stainless Drum	Aluminum Alloy Flights
Chrome-Plated Picks	Stainless Steel Shafting
Chrome-Plated Bolts	Stainless Steel Sprockets
Stainless Steel Picks and Holes	Chrome-Plated Steel Chain



HEADQUARTERS FOR ICE HANDLING, CUBING AND SIZING MACHINERY FOR 57 YEARS

EARLY YORK PLANNING helped solve refrigeration problems at Exchange Lemon Products Co. Above two York V/W compressors powered by 300 HP motor provide refrigeration for low temperature evaporation process. Here fresh fruit juice is concentrated by boiling at a temperature of +65°F. to +70°F. assuring fresh fruit quality and flavor.



GIANT YORK ECONOMIZERS (Evaporative condensers) part of various refrigeration systems utilized in phases of processing. Quality control is essential since lemon juice and lemon by-products are used in many ways from tasty lemon drinks to perfume and pharmaceuticals.

FINAL STEP in juice production is can-closing. At this stage, cans are sent to freezing tunnel which is maintained at —40°F. Once quick frozen, product is sent to refrigerated warehouse where it is stored at —10°F.

SORTED LEMONS at world's largest integrated lemon processing plant, Exchange Lemon Products Company, Corona, California, start the Sunkist juice process with fruit transported by huge stainless steel conveyors.

YORK® PRIOR PLANNING SERVICE controls refrigeration costs by early analysis of system needs

- **Major tasks assigned to today's refrigeration require major system expenditures.**
- **Thus, it is essential that the system incorporate its own safeguards for performance, accuracy, reliability, long life — without being over-engineered.**
- **York's 5-point PRIOR PLANNING SERVICE assures precise technical data on system needs early in the planning stages to help you, your consultants design a better system without costly changes later on.**

No two refrigeration systems are exactly alike. The conditions vary, the job to be done varies, even the speed in which the same job is to be done often varies. Through Prior Planning Service, the York engineer can help owner, contractor, consultant on *any* refrigeration problem. By calling on his vast experience and training in refrigeration, he can provide a thorough and accurate analysis of system requirements, determine the exact characteristic of the variables which affect system design, including:

- **ambient conditions**
- **cooling rate**
- **constant or variable loads**
- **quantity of water**
- **lowest temperature required**
- **power source**
- **location of engine room**

Armed with this information, it is then possible to design a system that will meet the needs precisely, provide insurance against product spoilage or production downtime, allow for expansion without requiring an over-investment.

Through Prior Planning Service, the York sales engineer brings to your refrigeration problem unparalleled experience. York refrigeration system installations include the gigantic environmental laboratory for U. S. Navy, Trenton; Sunkist's Exchange Lemon Products Company, California; Carling Brewery, Natick, Mass.; Lehigh Valley Cooperative Farmers milk plant, Allentown, Pa.

You may rely with complete confidence upon the good judgment and recommendations of the York engineer. Call him *early* in your planning, or write York Corporation, subsidiary of Borg-Warner Corporation, York, Pennsylvania. In Canada, Canadian Ice Machine Co., Toronto.

PRIOR PLANNING SERVICE works 5 ways

1. EARLY ANALYSIS gives you all the technical data needed to make decisions.

2. PROPER SELECTION OF EQUIPMENT. York supplies *all* types, can be objective in recommending the equipment that is right for the job.

3. BEST USE OF TIME, MATERIALS. York can help the engineers, contractors and consultants on space, design specification problems, avoid costly changes later.

4. INSTALLATION SUPERVISION. When desired, York supervises system installation, tests and adjusts it, trains operators on how to utilize all of its outstanding capabilities.

5. MAINTENANCE SERVICE. When you specify York, a York Certified Maintenance Contract can also be specified assuring regular system inspection, 24-hour emergency service, all repairs, complete reports on the system's conditions.

York refrigeration air conditioning — *the quality name in refrigeration*

HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

YORK CORPORATION

SUBSIDIARY OF BORG-WARNER CORPORATION

Practical Refrigerating Engineer

EXECUTIVE OFFICE

National Association Practical Refrigerating Engineers
433 N. Waller Ave., Chicago 44, Ill.

Officers

Bert C. McKenna, President
Chicago, Ill.

Frank L. Chase, Vice-President
New Orleans, La.

Roy T. Burns, Vice-President
Detroit, Michigan

Leland M. Kenagy, Treasurer
Kansas City

J. Richard Kelahan, Secretary
Chicago, Ill.

Cecil W. Sullivan, Sergeant-at-Arms
Memphis, Tenn.

Board of Directors

John N. Mariakis, Board Chairman
New Orleans, La.

Hubert B. Branham, Pocatello, Idaho.

R. A. O'Neill, Corpus Christi, Texas

John G. Muller, Kansas City, Kans.

M. E. Bell, Seattle

Eugene Rytlewski, Chicago.

LeRoy Etzel, San Francisco

Operating engineers of all refrigerating plants are invited to affiliate with the National Association of Practical Refrigerating Engineers, Inc., an educational association, "not-for-profit".

From the President's Desk

Chief Executive Urges Active Participation; Appoints Nominating Committee

ONE MAN cannot possibly live long enough to learn everything about refrigeration all by himself. However, with the ideas and knowledge of many accumulated and coupled with systematic study, an individual will have a better chance to acquire more know-how and data on where to find what he requires in his refrigerating duties. The environment in NAPRE will help the practical refrigerating engineer to fill that objective. Through the members, your chapter, and the educational benefits offered by the Association, the practical man can draw on combined experiences and a collection of knowledge which no man can achieve alone. Members are therefore urged to take an active part in this Association in order to improve themselves by promoting relationships between themselves and other members, within the chapter, and drawing on the educational benefits offered for their own good and indirect benefit of their employers.

Your president will never forget the story an old charter member of California No. 1, San Francisco, told him. He told of the first operating job he had in a San Francisco Brewery back in the early 1900's. The only one in the plant that knew anything about refrigeration was the chief engineer. According to this member, if a practical man valued his job he never asked any questions. To do so would indicate that you were trying to acquire the chief's know-how, and of course the chief interpreted that to mean the upstart was after his job. How lucky members of NAPRE are today that its membership does not believe in the old theory of "keep it to yourself".

Nominating Unit Appointed

NAPRE's manual contains a chapter on the duties of officers. This helpful guide serves as a memorandum to your president to appoint a nominating committee which will recommend candidates for office. It requires the committee to be appointed in May and to report their findings to the delegates at the Fall Convention. The nominating committee for 1957 will consist of: Leroy Etzel, past president and superintendent of refrigeration, Pacific Fruit Express Company; Regis Gubser, past president and vice president of engineering, California Consumers Corp.; Leo J. Vivien, past president and executive secretary, New Orleans Engineers Examining Board; S. Milton Rambo, member-at-large and chief engineer, Consumers Packing Company, Lancaster, Penna.; Archie Waterbury, chief engineer, Heidelberg Brewing Co., Tacoma, Wash. Alternates are Ken M. Holaday, past president and utilities engineer, Anheuser Busch, Inc., St. Louis, and Alvis J. Clay, past president and assistant chief engineer, Mid-South Refrigerated Warehouse Co., Memphis.

These committeemen will be investigating the activities of your present officers and looking over the membership rolls for likely officer material to be introduced to the delegates at our annual meeting. It is suggested that chapters and members-at-large send to the committee chairman any recommendations that they may have for the various offices.

Convention Planning

Now is a good time for members to reserve their vacation time to come to Chicago for our convention this year. In May, most organizations start asking when the various employees want to take their vacation and in the refrigerating game very few members can get away during the summer months. NAPRE members have a double-barreled reason this year for using their vacation time in November. The All Industry Air Conditioning and Refrigeration Exposition and Conference sponsored by the Air Conditioning and Refrigeration Institute will be held in Chicago November 18 through 21. With over 300 exhibits pertaining to refrigeration and industrial air conditioning, this should be a "must" in itself. However, NAPRE has scheduled its convention to run concurrently, which gives all members the opportunity to combine a convention trip with a visit to the show.

New Chapter Cops Honors

Tampa Chapter reported on a recent field trip during the month of March. The report was well done, informative and descriptive of the plant operations. In the opinion of the Report Awards Committee the Tampa Chapter and its scribe, John O. Holzberger, are therefore honored for the best report of the month.

Bert C. McKenna

In The Prevention of — Plant Failures

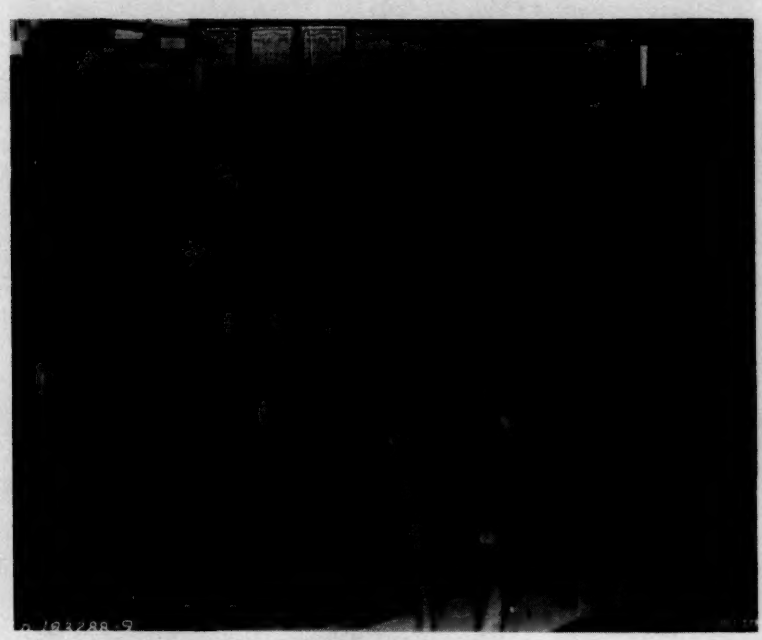


Fig. 1 — Modern high-speed synchronous motor drive for an 8-cylinder VW-type direct-connected reciprocating compressor.

Give Synchronous Drives Their Proper Care

ROBERT J. CRAWFORD
Service Manager
Ideal Electric & Manufacturing Co.
Mansfield, Ohio

DRIVES for compressors, pumps, fans, auxiliaries or other refrigerating system components are no different than the driven unit with regard to operating practices or maintenance procedures. Neglect makes them as susceptible to failure as any other equipment in the system. In the interest of conserving space and time, this discussion will deal with synchronous electric motor type drives, and compressor applications only. In general, maintenance of other motor types is similar, and operation varies slightly in accordance with the application and the control.

Synchronous motors are divided into two broad classifications, high speed, (see Fig. 1) and low speed, (see Fig. 2). Low speed class is generally designated as ranging from 450 rpm downward in speed. The high speed class starts approximately with 514 rpm and proceeds upward. Since this article deals mostly with the operation and maintenance of synchronous motors driving reciprocating compressors, most references will concern the low speed class.

Basic differences between the low and high speed classifications have to do mostly with starting characteristics, since after a motor has synchronized, either type maintains constant speed with only slight differences in pull-out torque. The pull-out torque characteristic of a synchronous motor is a measure of its abil-

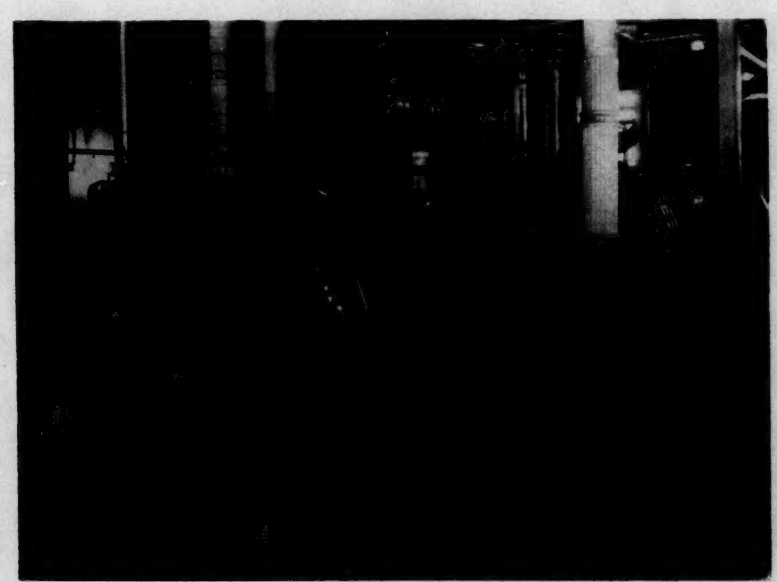


Fig. 2 — Low speed (up to 450 rpm) synchronous motor drive for a horizontal double acting NH_3 compressor.

First of two papers to be presented on the operation and maintenance of electric motor drives, this article is an actual transcript of a presentation by the author to the NAPRE Midwest Regional Educational Conference held April 26, 27, 28, at Milwaukee, Wis. Crawford was one of three featured speakers on the theme of improvement in plant operating and maintenance techniques. The Conference itself will be reported on in detail in the June issue, INDUSTRIAL REFRIGERATION.

ity to remain in step with the power service during an overload. This pull-out torque varies from 150 to 200 percent depending upon power factor rating, and may be made higher for special applications.

Proper application of synchronous motors requires an understanding of the starting characteristics just mentioned. This understanding will also be helpful in "operation and maintenance". To begin with, all synchronous motors start as induction motors, utilizing the squirrel cage bar winding provided in the pole tips and connected between poles. Most low speed and many high speed motors start with the driven member unloaded during the starting cycle. This enables the motor to get up to speed and to synchronize with a minimum of line disturbance and winding stresses.

Compares Motor Starting And Pull-in Torques

For the low speed synchronous motor, the standard NEMA[1] torques are 40 percent at starting and 30 percent at pull-in. Since these torques are low, it is necessary for compressor applications that either manual or automatic by pass valves be provided for unloading during the starting period. This is customary and is not considered to be a hardship. The starting current corresponding to these torques is also low, being about 2½ to 3 times full-load current (amperes) in most cases.

By way of comparison the standard NEMA torques for the high speed motors range up to 125 percent starting and 125 percent pull-in, with starting currents up to six times full-load. Where four to five times full-load current can be permitted, special designs are available with corresponding torque variations for full voltage starting. In general, however, the high speed motor will usually be thought of as requiring some form of reduced voltage starting.

Perhaps a little more definition will be helpful to approach "operation and maintenance". Starting torque refers to the amount of pound-feet necessary to break away from stand still. Pull-in torque is the torque required to bring the motor rotor up to a speed from which the motor can be synchronized by the application of direct current excitation. Usually, if the motor can not "break away" the load, an abnormal load condition exists or the unloading valves are not properly unloading. Also, if the motor can not reach a speed from which it can synchronize, there is again evidence of faulty unloading, or perhaps of a damaged squirrel cage rotor winding. A complete check should be made to locate the difficulty.

The low starting current characteristic of the low speed synchronous motor, along with its favorable load performance at synchronous speed, explains why its use as the preferred drive for reciprocating compressors has been universal for years. About 1918, compressor speeds were low (72 to 80 rpm), but as progress was made in developing better metals with more precise workmanship, permitting higher compressor piston speeds, motor speeds progressed upwards. Speeds of 164, 180, 200 rpm became common, followed by steady progress upward, to where 360, 400, 450 rpm are now acceptable and usual. Even at the lowest speeds the efficiency of the synchronous motor was far better than could be attained by any other form of drive. As speeds have increased, so have synchronous motor efficiencies, to maintain the prestige of this type of motor for compressor service.

Pole-To-Speed Relationship

Synchronous speed is governed by the number of poles, always expressed as an even number (See Table 1).

$$\text{Speed} = \frac{120 \times \text{line frequency}}{\text{no. poles}}$$

$$\text{or, for 60 cycles} = \frac{120 \times 60}{\text{poles}}.$$

Table 1 — Example of Synchronous Motor Poles - to - Speed Relationship

Poles	RPM	Poles	RPM
2	3600	14	514
4	1800	16	450
6	1200	18	400
8	900	20	360
10	720	22	327
12	600	24 etc.	327

The question of proper flywheel, flywheel effect, WR², or whatever term may be used, has always been a consideration in applying any type of prime mover drive to a reciprocating compressor. Before 1918, when the steam engine was about the only available prime mover to drive a reciprocating compressor, many engineers will recall some of the huge flywheels (incorporating a lot of WR²) necessary to smooth out the joint torque impulses of engine and compressor. When the synchronous motor replaced the steam engine, the torque impulses of the compressor still remained.

It was necessary to determine WR² values which would permit synchronous motors to operate without too much current pulsation. Above 66 percent pulsation it was found that the windings could be damaged. This value was established as the upper limit of pulsation permissible[3]. The necessary WR² has been incorporated in installations in many different ways. Sometimes a normal motor rotor was sufficient; again a separate flywheel or an auxiliary side rim was necessary. Fig. 3 illustrates a flywheel type synchronous motor in which the rotating element is on the outside, resulting in maximum WR² at minimum cost.

Synchronous Motor Elements

A synchronous motor is made up of three components (Fig. 4), the first being the *stator*, the second being the *rotor*, and the third being an *exciter* or some other form of D C power supply.

The *stator* frame carries the primary AC polyphase winding embedded in slots in the stationary magnetic core structure. This winding is insulated for and is capable of being connected to the primary power source that has been selected by the user and the power company to supply utility service to the installation.

The *rotor* component consists of a flywheel casting (commonly referred to as a spider) on which is mounted a number of field poles corresponding to the number of poles arranged in the stationary winding. These poles are wound with a suitable number of turns of rectangular insulated copper wire or strap around the pole body. A squirrel cage winding of bare rods is embedded in the pole tips, copper strap end rings connecting the bars together. This latter winding functions mainly during the starting cycle; although when running as a synchronous motor, the starting winding can and does have some damper effect.

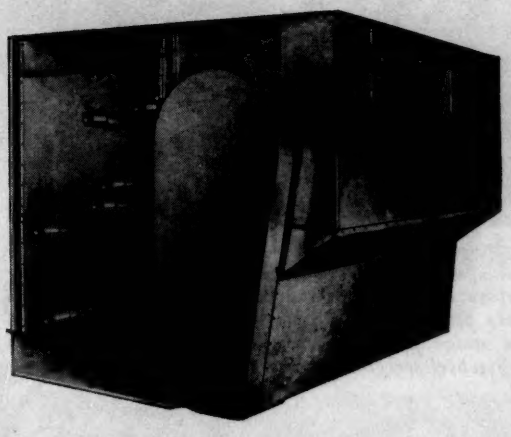
When the synchronous motor has accelerated to about 95 percent speed (considered to be the usual permissible point for field application), the third or *excitation component* comes into play, as the synchronizing relay functions to close the field switch to apply this D C excitation. It is assumed that the excitation source has

[1]NEMA, National Electrical Manufacturers Association. The Author refers here to standards of manufacture and operating characteristics established by the Association.

[2]The term WR² refers to weight of rim times mean radius of rim squared, usually expressed as pound feet squared.

[3]NEMA Standard MGI-8.07; Pulsating Armature Current.

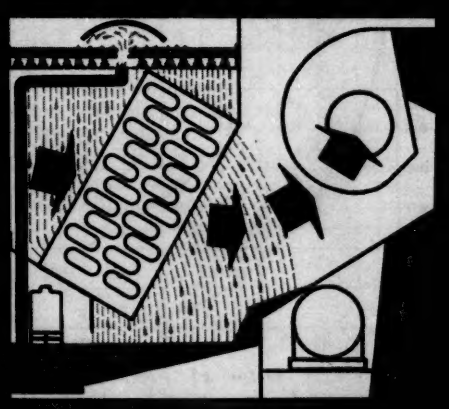
a completely new evaporative condenser design—by Carrier!



Exclusive new water distribution method requires no spray nozzles or eliminators. New lightweight, low-silhouette units ideal for roof-top installations. Easy access for servicing parts.

From Carrier, originator of the evaporative condenser, comes another major advance—an evaporative condenser completely new in design. This new unit sets new standards of efficiency in heat disposal where water supply and drainage are problems. Capacities range from 5 to 250 tons for all refrigerants. The principles and advantages of the new design are explained briefly below. For complete information, look up the Carrier dealer or branch office listed in the Classified Directory. Or write Carrier Corporation, Syracuse, New York.

AIR CONDITIONING · REFRIGERATION · INDUSTRIAL HEATING Carrier



New design features of Carrier Evaporative Condensers

Using a unique, Carrier-developed water distributing process, the new Evaporative Condensers operate without spray nozzles or eliminators. Here's how: Powerful centrifugal fans draw liberal quantities of air into the unit and over the water-drenched condensing coil. The evaporative cooling effect of the air on the water passing over the coil condenses the refrigerant vapor in the coil tubes. The liquefied refrigerant then passes from the coil and returns to the cooling system, where it is used in evaporators for air conditioning or process refrigeration.

Coil wetting is accomplished by a simple but highly effective water distributing pan arrangement above the condensing coil. Water, pumped to the top of the pan, is diffused evenly over the entire coil surface through regularly spaced orifice openings in the pan. As the metered water passes through the lower interceptor screen, it is broken into small, rainlike droplets which completely drench the coil surface. Completing the cycle, the water flows by gravity into the base pan, where it is strained before being pumped again to the water distributing pan above.

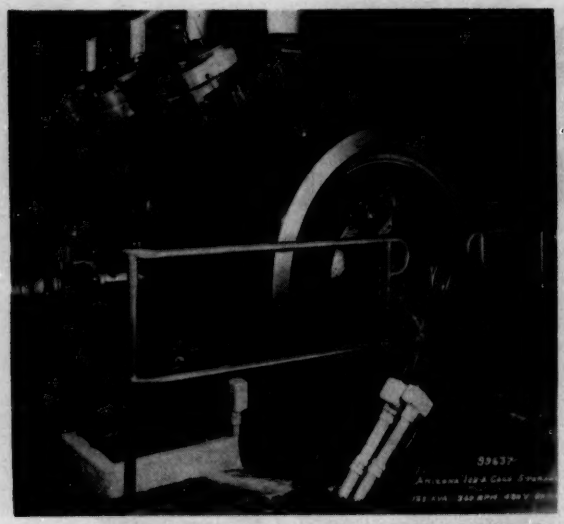


Fig. 3 — In compressors such as this, considerable flywheel effect must be built in. This synchronous motor therefore has a flywheel type rotating element as the outside perimeter of the motor, instead of the conventional stator frame. The rim effect provides maximum flywheel weight at more economical first cost.

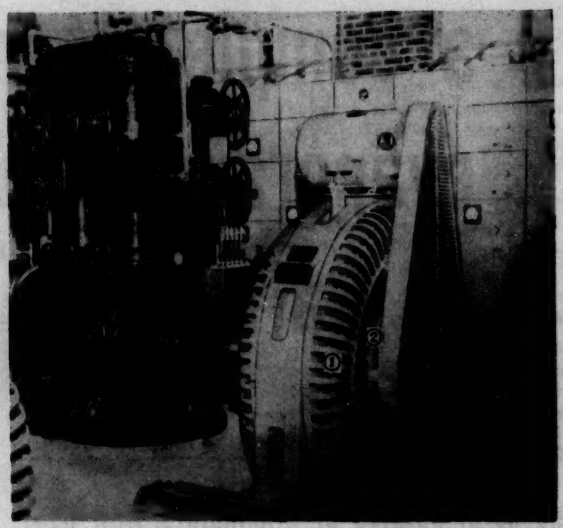


Fig. 4 — Three principal components to the synchronous motor are: (1) Stator, (2) Rotor, and (3) Exciter. This machine, like those pictured in Fig. 2, is called an engine-built motor; so-called because the compressor has an extended crankshaft upon which the rotor coils and collector rings are mounted.

developed voltage and is available when the field switch closes. This excitation may be provided by a separate motor generator set, a direct connected exciter, a belted exciter, a rectifier, or a separate D C bus.

Power Factor Correction

Whenever synchronous motors are mentioned, *power factor* enters into the discussion. The main questions seem to be:

(1) What happens to power factor at light loads?

(2) When should an 0.8 leading power factor machine be used?

(3) What method can be used to determine the power factor at any given load point?

The first two questions can be answered by using the graphs in Figs. 5 and 6. For driving a given mechanical load, the 1.0 power factor motor is lower in price, more efficient, and draws no lagging or leading current when operated at normal excitation. The 0.8 power factor motor operates at leading power factor, and is used to improve the power factor of the power line to which it is connected, as well as for delivering rated horsepower output.

If either an 1.0 or 0.8 power factor motor is operated at partial load and full DC excitation maintained, the efficiencies will be below the listed value and both motors will operate at a leading power factor. The method of using these curves is indicated by the following sample calculation:

Given: A 125 hp, 0.8 power factor synchronous motor operating at 75 hp and normal excitation. Required: Find the reactive KVA the (amount of

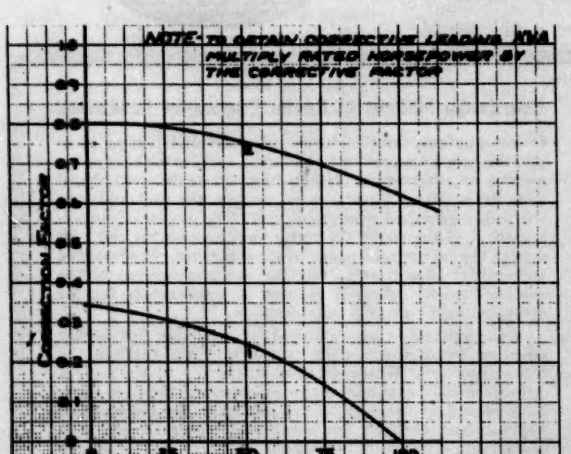


Fig. 5 — Power factor correction chart for synchronous motors. Curve 1 represents a unity (1.0) power factor with 40°C rating. Curve 2 is for a 0.8 pf (power factor) motor of 50°C field.

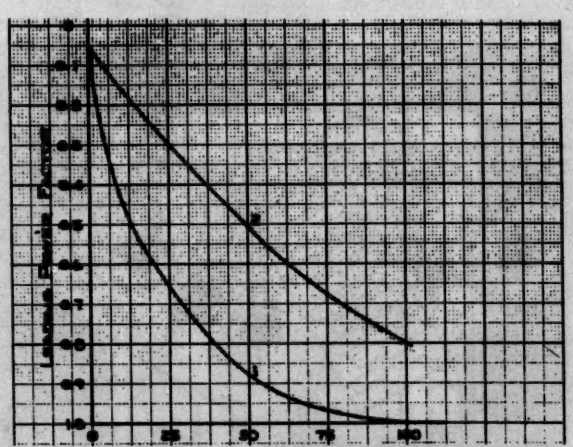


Fig. 6 — Power factor of two synchronous motor types is depicted by the two curves, 1 being for a unity pf drive and 2 for an 0.8 pf unit. The horizontal line represents percent of rated horsepower load.

leading current pumped back into the lines, increasing plant power factor) and the power factor of the motor. The percent horsepower becomes

$$\frac{75}{125}, \text{ or } 60 \text{ per cent.}$$

From curve 2, Fig 5, at this horsepower, the leading KVA is

$$0.745 \times \text{rated hp, or}$$
$$0.745 \times 125 = 93 \text{ KVA.}$$

Curve 2, Fig 6 shows the power factor at 60 percent load to be 0.58, leading.

In order to obtain power factor improvement, do not use a 1.0 power factor motor of larger horsepower rating than required by the driven load. Instead, use an 0.8 leading power factor motor of proper horsepower to help give the desired power factor correction. In almost all cases, it will be found that the amount of line power factor correction will not warrant running a 1.0 power factor motor at no load condition, but a 0.8 motor will offset the added initial cost by actually saving on the power bill where power factor penalty or bonus applies.

Determining Power Factor

The simplest method of finding unity or 1.0 power factor on a synchronous machine, when a power factor meter is not available, involves only an adjustment of the DC excitation voltage. Using the available rheostat on the panel, raise or lower the amount of excitation, and at the same time watch the AC ammeter. When the AC ampere reading is at the minimum or lowest value, the motor is operating at 1.0 power factor, which is the most efficient point of operation.

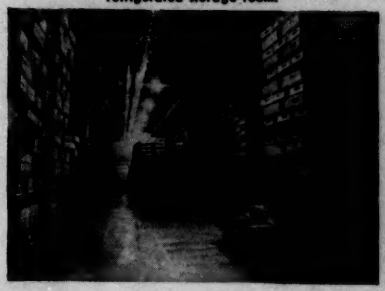
As an example typical of this last question, an operator recently asked "How do I set the excitation for 0.8 power factor operation at partial loads?" There could be more than one answer to this, but the best answer is "don't try". If this motor was purchased with a rating of .8 power factor leading, in order to obtain correction for other induction motors, the most logical thing to do would be to operate the motor continuously at full load rated field excitation so as to obtain maximum reactive KVA correction. The example previously referred to, indicated as a typical case, that the reference motor would operate at .58 power factor leading when loaded 60 percent, thus giving a few more reactive KVA.

If it is found after purchase, that an 0.8 power factor motor was not necessary for correction purposes,

The new, modern, up-to-date cold storage plant of Higley Cold Storage, Inc., Mason City, Iowa.

HIGLEY
COLD STORAGE, Inc.
Mason City, Iowa

View of the 400,000 cu. ft. refrigerated storage room.



Vilter VMC and Vertical compressors which provide the refrigeration.

Q. How does a modern cold storage plant keep in tune with the times?

A.

costs less to own*

The new Higley cold storage warehouse contains 400,000 cu. ft. of refrigerated space, one-fifth of which is partitioned off as cooler storage, but piped heavy enough for possible use as a freezer.

All refrigeration equipment in this modern plant was furnished by Vilter—the quick freezing operation is handled by a Vilter Blast Freezer which freezes up to 42,000 pounds of turkey or other products per day. Refrigeration for the Blast Freezer is supplied by a 2-stage Vilter ammonia system. The first stage consists of a Vilter twin cylinder booster compressor and a four-cylinder VMC booster. Second stage compression is handled by a six-cylinder VMC compressor. Another Vilter two-stage ammonia system supplies the refrigeration for the 5,000 feet of Vilter Zer-O-Disc Fin Coil used in the storage rooms. The first stage consists of 2 six-cylinder VMC's and the second stage of a six-cylinder VMC. Two Evaporative Condensers provide the condensing surface for both systems.

Protective devices include not only the standard oil pressure failure, high and low pressure cut-out, capacity reduction and unloader switches, but also crankcase heaters, and a completely integrated electrical control system for fully automatic operation of the engine room equipment.

* Savings in low first cost are not the complete answer when considering the installation of refrigeration equipment. But savings in terms of years of extra service, reliable performance and minimum maintenance—that's where Vilter excels in low-cost ownership.

Vilter®

QUALITY CRAFTSMANSHIP that lasts...

ENGINEERING DESIGN that guarantees performance

REFRIGERATION AND AIR CONDITIONING

THE VILTER MANUFACTURING COMPANY, Milwaukee 7, Wisconsin

Air Units • Ammonia & Freon Compressors • Booster Compressors • Bandaloi Coolers • Water & Brine Coolers • Blast Freezers • Evaporative & Shell & Tube Condensers • Pipe Coils • Valves & Fittings • Pekins & Peterbilt Ice Machines

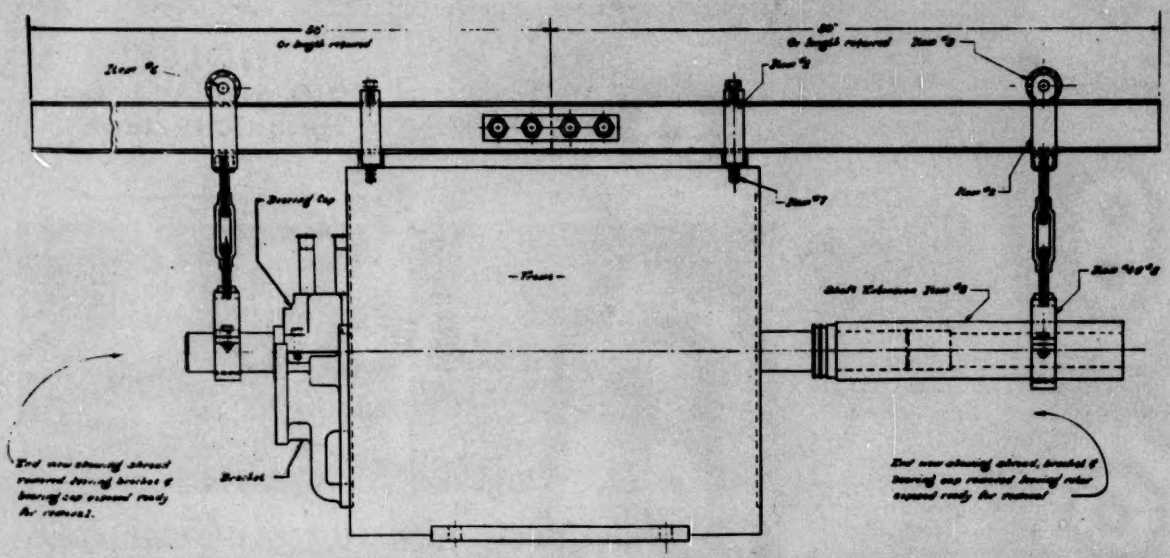


Fig. 7 — Removing rotors from a bracket type motor can be quite a chore. Depicted here is method devised for pulling the rotor where an adequate overhead crane or hoist is not available. Motor shrouding is removed from both ends. A 2-piece I-Beam is clamped atop the stator frame. The bracket and bearing assembly is removed from the end opposite the driven unit. A shaft extension is attached. Roller or trolley members with shaft clamp-type saddles and turnbuckles are attached and adjusted. Rotor can then be rolled out of the stator part way. Extension is then removed and attached to opposite end of shaft, and trolleys replaced. Rotor can then be drawn completely clear of the frame. To replace, the procedure is merely reversed.

then again it would be logical to reduce the excitation to the 1.0 power factor value to obtain maximum efficiency rather than unwanted corrective KVA.

Inspection Practices

Local plant conditions will determine how often complete inspection of a synchronous machine should be made. If a plant maintenance schedule for inspection of compressors has been set up on a definite repetitive cycle, this would prove an opportune time to completely inspect the motor. An annual or biannual inspection should not interfere with a once a month plan of cleaning the motor.

Monthly inspections should involve checking the rings and commutator surfaces. Brushes should be checked for wear and tension. Windings of the motor should be either blown off or vacuumed out. The cleaning system is completely up to the engineer-in-charge, but if air is used to blow the machine out, a hand blower system is preferable. Obtaining air in this manner reduces the danger of

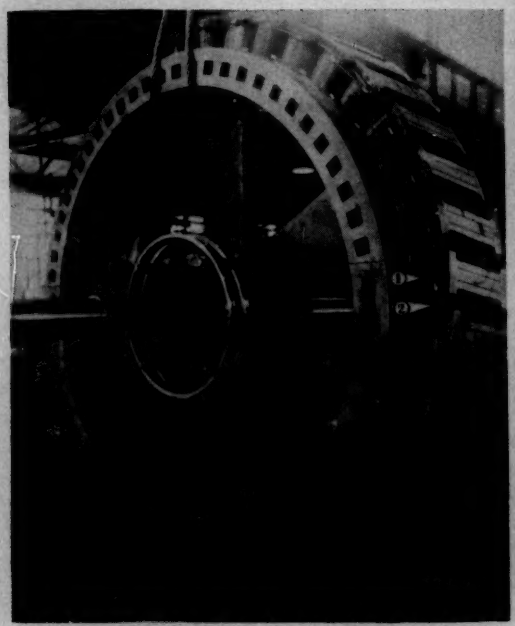


Fig. 8 — Windings for a large slow speed rotor are pictured: (1) field coils; (2) squirrel cage, or starting windings and connectors.

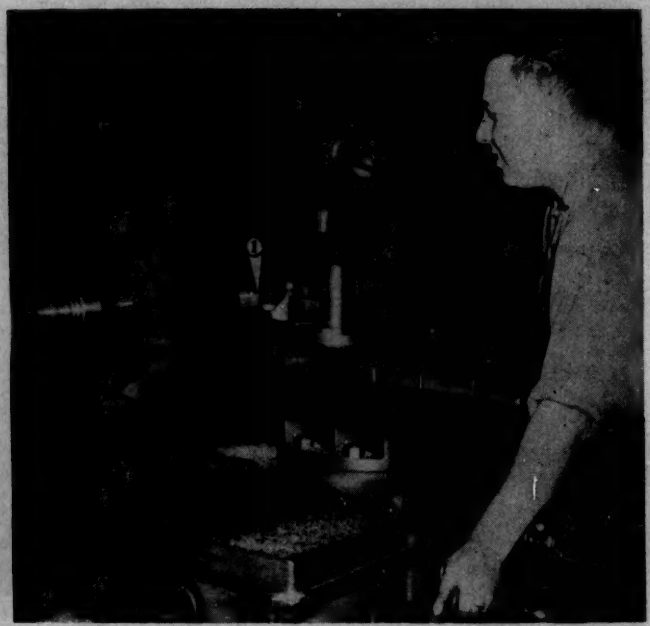


Fig. 9 — Turning an excitation generator commutator in a lathe prior to undercutting mica between the bars.

using too high a pressure, or of forcing moisture through the windings from an air line that has collected water.

Inspection Procedures

To prepare a motor for an annual or biannual inspection, disconnect the switchgear through the disconnects, and open all leads from the stator and brush holders. *When disconnecting the leads, these should be tagged using either plastic stick-on tape or metal clamp type tags.* The motor at this time should be checked with an insulation resistance tester[4], and air gap readings taken. Both of these readings should be kept for future reference.

Dowels should then be removed (if the machine has not been dowelled, it should be done at this time to aid in reassembly), and the stator moved back on the sole plates. Most slow speed motors are equipped with this type of construction, but in any event, the stator and rotor cores will have to be exposed. In the case of a bracket type machine, a simple method of removing the rotor has been devised by using an I-beam with rollers, attached to the frame of the motor (See Fig 7). This method of working on a bracket type machine eliminates setting up a tripod or some other less convenient means of removing the rotor.

Windings should be cleaned with a suitable type of solvent. Care should be taken when cleaning the windings with solvent that the insulation varnish is not dissolved[5]. After the stator and rotor have been thoroughly cleaned and dried, the squirrel cage windings (Fig 8,) should be checked at all of the welded connections. The field poles and stator windings should be checked making sure that the poles are not loose and that the stator windings are tight in the slots.

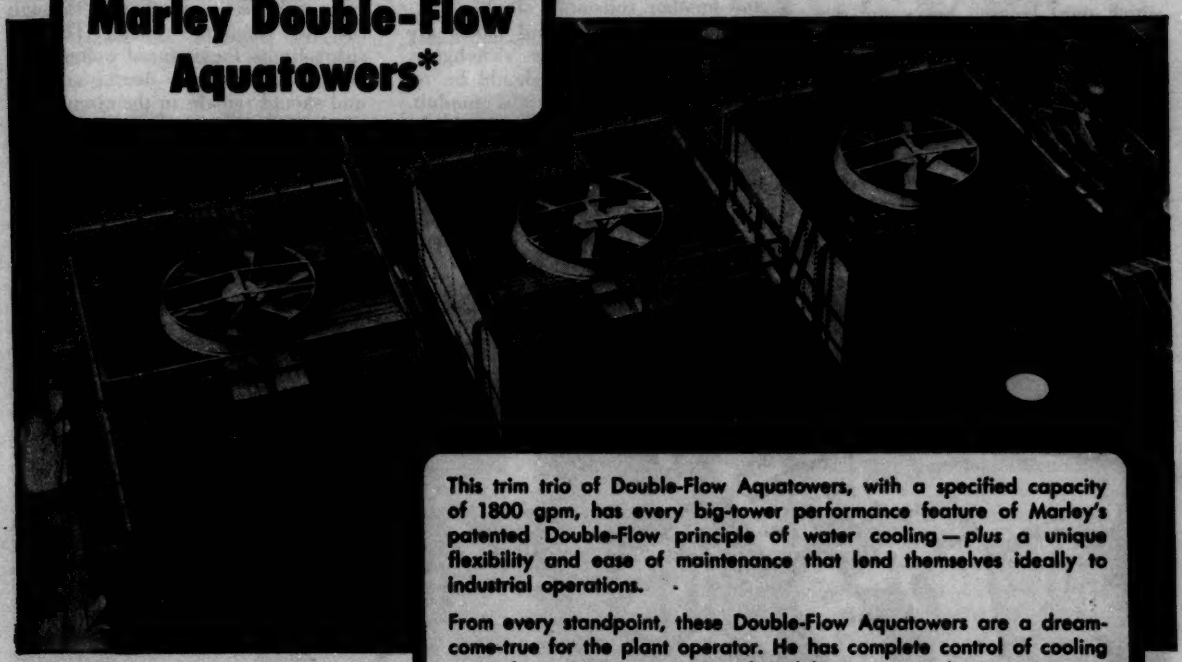
After the windings have been checked and found to be in good shape, a coat of air dry varnish should be applied. Although the air

[4]See "Electrical Maintenance of Switchgear, Starters, Motors, in the Prevention of Refrigerating Plant Failures"; Regis Gubser, V.P. Engineering, Calif. Consumers Corp; July '56, Industrial Refrigeration, Page 31.

[5]Numerous new safe solvents have been developed recently. Write the NAPRE Educational Committee for a 2-page bulletin on methods using "Freon" solvents.

Big-time Cooling with small-time upkeep

Marley Double-Flow Aquatowers*



This trim trio of Double-Flow Aquatowers, with a specified capacity of 1800 gpm, has every big-tower performance feature of Marley's patented Double-Flow principle of water cooling — *plus* a unique flexibility and ease of maintenance that lend themselves ideally to industrial operations.

From every standpoint, these Double-Flow Aquatowers are a dream-come-true for the plant operator. He has complete control of cooling water for a sensitive process with widely varying cooling requirements because he can operate 1, 2, or 3 units at any part of rated capacity with full performance. Complete shutdown is never necessary. Rate and condition of flow are observable at a glance; regulation of flow is simple and positive. Mechanical equipment is immediately accessible for routine service, and the low-silhouette design is such that any service operation can be accomplished quickly and safely. Maintenance couldn't be simpler; flexibility couldn't be greater.

There's nothing like Marley's Double-Flow Aquatower for intermediate-capacity cooling if your plant requires sizable air conditioning, refrigeration or light industrial services. For information, see your Marley Engineering Sales Office in any of 55 cities, or write today for Bulletin DFAQ.

*Trademark Reg. *U. S. Pat. No. 2776121

MARLEY

The Marley Company

Kansas City, Missouri

gap readings should show the amount of bearing wear, the bearings should be opened for inspection and thorough cleaning of the bearing and housing. The machine should then be reassembled, being very careful not to damage the insulation of the stator coils during this phase of the operation. After the machine has been reassembled, new insulation resistance readings should be taken and the final air gap readings recorded.

Exciter Inspection and Motor Starter Check

Inspection is not complete until the exciter and motor starter have been checked. Usually, the motor is considered as the most important part, but the old adage "a chain is no stronger than it's weakest link" still proves to be quite true. The commutator surface of the exciter should be inspected to determine if it should be turned. Pay particular attention to the mica between the segments which must be well below the commutating surface.

The exciter should be disconnected and tagged in the same manner as the motor. After disconnecting, insulation resistance readings should be taken and recorded, and the machine disassembled. The exciter windings should be cleaned with solvent and the commutator risers (Fig 9,) should be checked for high resistance connections. A visual inspection will usually disclose this, and will be evidenced by melted solder. If the commutator shows evidence of bad joints, excessive roughness, or high mica, it is probable that a service shop should go over the armature, repair risers if necessary, turn and undercut commutator and varnish windings. In such a case, the balance of the windings should also be revarnished before reassembly.

If the machine is equipped with ball bearings, old grease should be flushed out and new grease installed. Sleeve bearings can be visually checked at the load points, which would be in the direction of the belt pull, in the case of a belted machine and the downward direction on a motor generator set. If wear is noticed, the concentricity should be checked with a micrometer. If more than .005-in. wear is shown, the bearings should be replaced. The exciter is now ready for reassembly and another resistance check.

While the exciter and motor are disconnected from the switchgear, the switchboard leads should be resistance tested through the conduit. All relays and contactors should be tried for free action. Oil or grease should never be applied to the bearing surfaces. If the movement seems to drag, it should be worked free, perhaps dissembled and cleaned. Unless the manufacturer recommends otherwise, pitted contacts should be smoothed with a mill file, and lightly greased with vaseline (Fig 10).

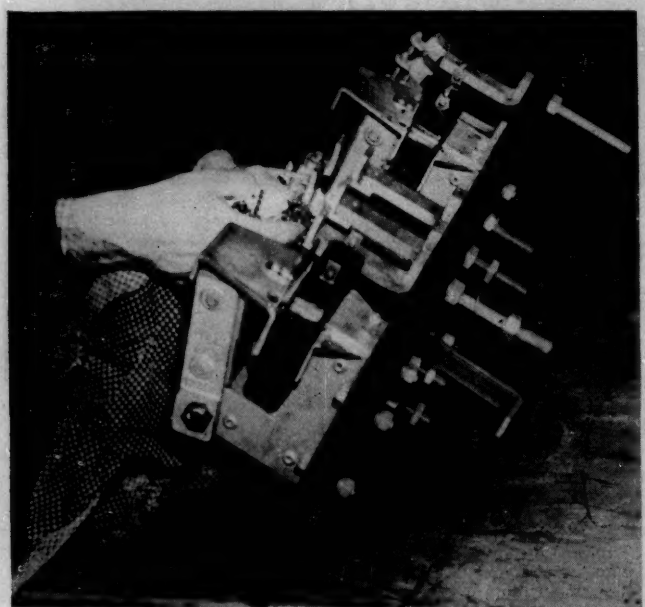
The armature or sealing surfaces of all relays should be cleaned and a light coat of vaseline spread on and wiped off with a rag. An overabundance of grease on the surfaces of the cores could cause them to stick. All lead connections should be tightened at this point with particular attention to the heavy motor leads. If it is at all possible to energize the control circuit, this should be done at this time. It provides an opportune time to become familiar with the protective devices and check their operation.

Reassembly and Testing

All leads should be reconnected and the bearings filled with oil. To make sure that no errors have occurred, a "field continuity" check should be made at this time. Normally during the starting period, the rotor field leads are shorted through the field discharge resistor. This resistor limits the induced voltage developed in the rotor during starting and should remain in the circuit, until the DC voltage is applied to the field coils.

In order to make this check, the collector ring brushes should be lifted and an ohm-meter placed

(Continued on page 58)



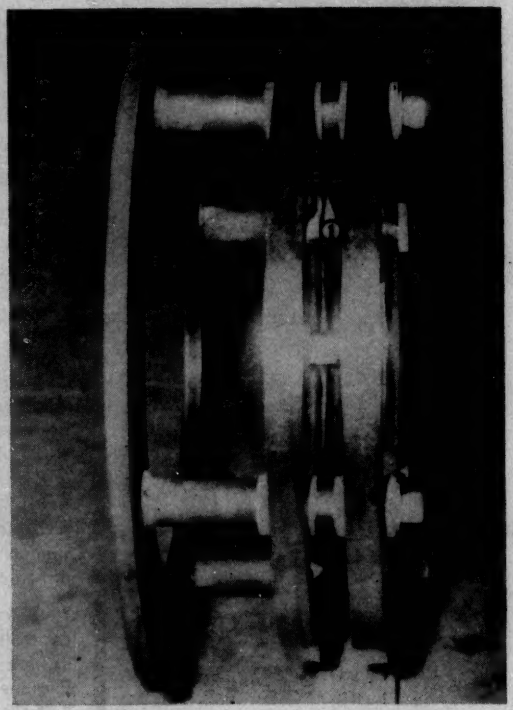


Fig. 10 — (Above) Cleaning and applying a "wipe-off" coat of vaseline to motor starter contactor elements or parts. Fig. 11 — (Right) Spark -gap protection provided on modern motors. An open circuit in the field would normally permit excessive voltage to build up; resulting in damage to motor, controls, or both. This device (1.) acts as a "safety-valve", relieving pressure (voltage) in excess of safe limits.

NAPRE

Question Box

The National Educational Committee, NAPRE, answers monthly in this column, operating problems forwarded by members. The Committee appreciates answers from the field. Address questions and answers to Prof. Harold P. Hayes, Dean of Engineering, State Polytechnic College, San Luis Obispo, Calif.

Water Temperature Control For Defrost and Condensing

QUESTION NO. 1167: Suggestions are welcome on how to raise temperature of the water used for defrosting in an automatic plant. In winter time high side pressure drops to 65 psi (ammonia plant) and in warmer weather the most head pressure is 110 psi. Condensing and defrosting water source is a cold spring. Water leaves the condenser so cold that getting evaporative units to defrost is difficult.—C. P., Yakima.

ANSWER: With an NH_3 condensing pressure of 65 psig, the condensing temperature would be about 45 F and I presume that the water from the sprihg will have a temperature of about 35 F. Of course this is very cold to be used for defrosting purposes. If the water temperature were only about 10 degrees warmer no difficulty would be experienced. If water is available from the domestic water supply system, perhaps the best method is shift to this supply for defrosting water. If this is not feasible I would suggest installing electrical insertion type heaters in the water defrosting lines.—N. S., San Luis Obispo, Calif.

Transistor Functions

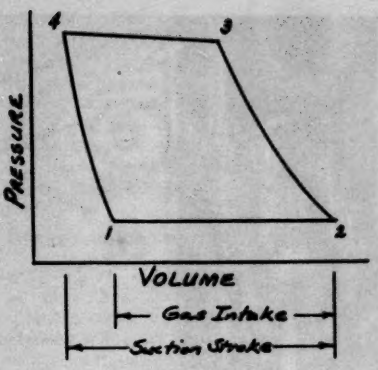
QUESTION NO. 1168: Transistors don't have much to do with refrigeration, but what are they and what do they do?—FLB, St. Louis.

ANSWER: Transistors are a development less than ten years old which are supplementing and replacing vacuum tubes. Imagine, for a moment, a perfectly pure sample of germanium (ore of the basic elements). If you added certain types of impurities you could create "holes" into which electrons would flow (if you had electrons available). On the other hand certain different impurities can create a surplus of electrons. Therefore if you placed a piece of germanium with "holes" in it adjacent to one with a surplus of electrons you would have electrons flowing from one piece into the other to fill the "holes". Furthermore if you apply a voltage to the junction of the two pieces, you can control the amount of electrons flowing or, in other words, the current. This effect is exactly what a vacuum tube accomplishes, i.e., you can regulate the current in a control circuit by varying an applied voltage. You can extend the above idea into more complicated applications but the basic idea is the same.—H. P. Hayes.

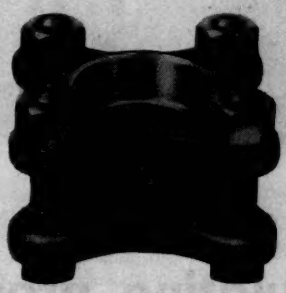
Add to Compressor Capacity By Doubling RPM?

QUESTION NO. 1169: Theoretically, if speed of a 4 x 4 in., 900 rpm, compressor is doubled by changing pulleys, will capacity double? JERK, Chicago.

ANSWER: Yes, theoretically the capacity would double although actually, of course, it would not. The capacity of a



Oval Style — ¼" — 1"



Square Style — 1" — 4"

Round Style — 5" — 12"

Wolf-Linde Since 1880

FORGED STEEL FLANGES FOR WELDING

SPEED UP installation of pipe lines, flanged valves, and flanged fittings where welding facilities are available. Wolf-Linde Welding Flanges are the socket type, and are compact, shock-resistant, and of high strength with tongue and groove construction. Deep socket permits self-alignment of pipe. Weld is made at outer edge of flange, thus preventing welding particles from entering pipe. Flange bore matches inside diameter of pipe, giving free flow with minimum pressure drop. Offered in sizes ¼" to 12" IPS, inclusive.

The ease of installation, the elimination of precision measuring and cutting and bevelling of pipe, and the low first cost of these quality flanges assure you multiple savings.

Also available — A full line of Wolf-Linde threaded flanges — 4" IPS and smaller from steel forgings, and 5" IPS and larger from alloyed iron castings.

A request on your letterhead will bring your free copy of:

- **Ammonia Valves and Fittings**
- **Evaporator Pressure Controls**

DERSCH, GESSWEIN & NEUERT INC.
4849 W. GRAND · CHICAGO 39

Styrofoam* gives best combination of insulating properties

COMPARE STYROFOAM	INSULATIONS			
	STYROFOAM	A	B	C
Low "K" factor	X		X	X
Superior water resistance	X	X		
High compressive strength	X	X		X
Light weight	X		X	
Superior resistance to rot and vermin	X	X		
Easy handling and fabrication	X			
Low-cost installation	X		X	
Lowest cost per year service	X			

Permanent "K" factor average, 0.25. Avg. density, 1.8 lbs. per cu. ft. No odor. No food value. Pleasant to work with. Fabricates with common tools. Does not crumble or settle.

Northern Cold Storage speaks from experience—

Since 1950, The Northern Cold Storage Company, Bear Lake, Michigan, has used over 300,000 board feet of Styrofoam (a Dow plastic foam). Its many outstanding properties have satisfied the most exacting demands for low-temperature insulation. Northern's Plant Engineer Burley reports particular satisfaction with the low "K" factor and the way Styrofoam does not absorb water. When Northern expanded in '51 and again in '56, experience made Styrofoam a necessity. For Styrofoam data, write THE DOW CHEMICAL COMPANY, Midland, Michigan – Plastics Sales Department PL1704C.

*Styrofoam is a registered trademark of The Dow Chemical Company.

YOU CAN DEPEND ON DOW

WHICH STYROFOAM DISTRIBUTOR IS NEAREST YOU?

CALIFORNIA
Los Angeles 13: Pacific Foam Products Co.
San Francisco: Western Foam Products, Inc.

FLORIDA
Tampa: The Soule Co.

GEORGIA
Atlanta 8: Badham Sales Co.

ILLINOIS
Chicago 11: The Putnam Organization, Inc.

IOWA
Des Moines: Wilson-Rogers, Inc.

KANSAS
Kansas City: Styro Products, Inc.

MASSACHUSETTS
Ipswich: Atlantic Foam Products Co.

MICHIGAN
Detroit: Par-Foam, Inc.
Midland: Floral Foam Products

MINNESOTA
Minneapolis 8: Edward Sales Corp.

MONTANA
Billings: Madden Construction Supply Co.

NEW YORK
Rochester 20: William Summerhays Sons Corp.
Long Island City 1: Styro Sales Co., Inc.

OHIO
Cincinnati: The Seward Sales Corp.
Cleveland 3: Structural Foams, Inc.

PENNSYLVANIA
Plymouth Meeting: G & W H Corson, Inc.

TEXAS
Houston: The Emerson Co.

UTAH
Salt Lake City 10: Utah Lumber Co.

WASHINGTON
Seattle 9: Wiley-Bayley, Inc.

WISCONSIN
Milwaukee: S & S Sales Corp.

CANADA
Edmonton, Alberta: Northern Asbestos & Bldg. Supply Co., Ltd.
Kitchener, Ontario: Durofoam Insulation, Ltd.
Vancouver, B. C.: Wiley-Bayley Co., Ltd.

THE DOW CHEMICAL COMPANY
Midland, Michigan

compressor is determined by the pounds per minute of refrigerant that it can pump. The pounds per minute are determined by the volume (cubic feet) per minute that can be pumped. The cfm depend upon the number of times per minute the cylinder can be emptied and filled. Since the cylinder is emptied and filled once for each revolution of the crankshaft, the capacity therefore depends directly upon the rpm of the crankshaft.

For practical purposes, however, the greater the speed, the more difficult it is to draw gas through the valves. Consequently if the compressor speed is doubled, the capacity will tend to double but will not quite do so. It is interesting to note that in the actual case, gas is not drawn into the cylinder during the full suction stroke. This is because the compressed gas left in the cylinder at the end of the discharge stroke uses up some of the suction stroke while it is expanding to the suction pressure.—H. P. Hayes.

Analog On Heat Load Problem

QUESTION NO. 1170: Professional trade journals refer to analog methods of calculating heat loads. What is an analog? How can it be used to determine heat gain?—HDB, Milwaukee.

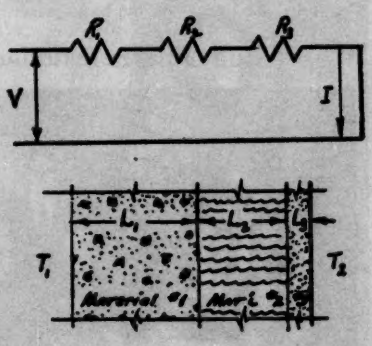
ANSWER: It has been found that many things such as heat transfer follow the same laws as electric circuits. Example:

Voltage, V, corresponds to temperature difference $T_1 - T_2$.
Current, I, corresponds to heat flow Q.
Resistance, R, corresponds to insulating effect L/kA,

where

L = Thickness
k = Conductivity, and
A = Area

Suppose we had a wall consisting of three different types of materials. It could be represented as an electric circuit as shown below.



Electrically,

$$\text{Current} = \frac{\text{Voltage}}{R_1 + R_2 + R_3}$$

while Heat Transfer is expressed

$$\text{Heat Flow} = \frac{T_1 - T_2}{(L/kA)_1 + (L/kA)_2 + (L/kA)_3}$$

If this problem were set up on an analog computer with proper values, the current flow could be read on an ammeter and converted to the correct heat flow answer without actually doing the heat flow calculations. In simple problems such as this one, not much time is saved. In very complex problems the analog method is very valuable.—H. P. Hayes.

Immersion Shrimp Freezing

QUESTION NO. 1171: A client of ours has installed an ammonia freezing plant to handle shrimp tails. He has made an attempt to determine what solution should be used in his immersion tank but has met with no success. Can you offer any advice as to what solution to use?—HJT, Brisbane, Australia.

ANSWER No. 1: In the immersion freezing of shrimp a solution containing glucose (34 percent), salt (12 percent) and water (54 percent) has proven quite successful. Corn syrup manufactured under the trade name of "Frodex" by the American Maize Company, 250 Park Ave., New York, N.Y. and common rock salt will satisfy the glucose-salt requirements. The above solution has a freezing temperature of about 0 F. If a lower freezing temperature is required a glucose (20 percent) - salt (20 percent)solution having a freezing point of minus 5 F can be used.—J. W. S., Boston, Mass.

ANSWER No. 2: Several immersion freezers have been installed on trawlers in this country. An excellent product is obtained since the shrimp are frozen soon after they are landed on the deck. Furthermore they are completely frozen within five minutes, according to the manufacturer of the equipment, but to be perfectly safe he recommended fifteen minutes for freezing. The shrimp do not stick together. They have a white frost over their surface, which is probably a mixture of water (snow), salt and sugar crystals. The difficulty encountered on the trawlers in using immersion freezing was the maintaining of the proper concentration of the solution in which the shrimp are frozen. This should not be insurmountable in a plant on land since a technically trained man could be employed to supervise and maintain the proper concentration.

The solution used is the following: two pounds of salt (sodium chloride) and two pounds of dextrose (glucose) to one gallon of water. This solution freezes at approximately zero degrees F and if frozen will not precipitate either the sodium chloride or dextrose. The dextrose used in this country is sold under the trade name Cerelose, it is produced by Corn Products Refining Co.—Dr. E. A. F., Baton Rouge, La.

ANSWER No. 3: While we have done considerable experimental work with pilot plant units over the past three or four years in the freezing of shrimp and lobster tails by direct immersion in brine, we have not as yet sold any brine immersion freezers for this service. It certainly appears, however, from our experiments that there

is no difficulty in freezing shrimp as large as 12 to 15 pounds in approximately 20 minutes by direct immersion in salt brine held at 0 to plus 5 F. The big problem seems to be that it is the general opinion the trade wants their shrimp glazed. This does not appear to be a fact from my own observation, as the 10 to 12 oz. pack of individually frozen shrimp sell well.

However, most of our shrimp plants down in Mexico are still freezing the bulk of their shrimp in 5 lb. cartons, or in stainless steel trays in a 5 lb. block of ice, since this is readily acceptable by the trade and makes them a profit. Their main objection to freezing shrimp or lobster tails individually before packaging is that the shape of the shrimp is then fixed and it is sometimes hard to put the required amount in a given sized carton. Placing the shrimp or lobster tails while they are limp is a simple matter, so they prefer to continue doing it in this manner. —R. E. M., Los Angeles.

ANSWER No. 4: It might be worthwhile to add that ice glazing is fairly common practice in the frozen fish industry. The ice glaze is produced by dipping or spraying using potable water. It is used to prevent loss of moisture from the product and to prevent access of air to the fish, thus retarding the development of rancidity.—H. P. HAYES.

Basic Differences Between Single & Polyphase Motors

QUESTION NO. 1172: Explain basic differences between a single-phase and three-phase electric motor. Why does a single phase motor need a special starting capacitor? What happens to a three-phase motor if one phase opens circuits when the motor is running?—A.W., Indianapolis.

ANSWER: This principle is best explained by using induction motors as an example. When a voltage is applied to the stator, a current flows which in turn produces a current in the rotor. This happens in the same way that a transformer produces a current in the secondary. However, no rotation will take place unless there is a slight time lag between the current in the stator and that in the rotor. A three-phase supply produces this time lag by itself and therefore no auxiliary starting devices are needed. In the single-phase motor, an artificial time lag must be introduced and this can be accomplished by using a starting capacitor in the circuit.

Once a motor is started, the necessary time lag between rotor and stator current exists whether or not capacitors are in the circuit.

Therefore, a single-phase induction motor can be started by using a capacitor in the circuit and the capacitor may be cut out when the motor is up to speed. A three-phase motor needs no auxiliary starting device.

When a three-phase motor is running and one phase open circuits, the motor will run as a single-phase motor but will overheat if the load remains constant.—H. P. Hayes.

New Questions

Literature on Ammonia vs. "Freon" Installations

QUESTION No. 1173: Could you suggest available literature which may discuss the merits pro and con of ammonia and "Freon" installations for plants of approximately 50, 100, and 200-ton capacities. In addition to dressed beef operations our firm also packs frozen meats.—N. S., N. Jersey.

Pounding in Compressor

QUESTION No. 1174: What does a pounding sound in the compressor, when a vacuum is being produced, indicate?—H. W., DePere.

Power Rates Increased Stimulating Efficiency Moves

QUESTION No. 1175: On December 1, 1956, power rates in the Los Angeles area for a 50-ton ice plant were increased about 15 percent. How can plant efficiency be stepped up to effect enough savings to off-set the rise in power rates?—F. H.

Obtaining Temperatures of Liquid Refrigerant

QUESTION No. 1176: What is the best method of taking the temperature of a liquid refrigerant in a pipe when no thermometer well is available?—L. W., Oshkosh.

Effect of Rain on Evaporative Compressor

QUESTION No. 1177: Does rain have any effect on the capacity of an evaporative condenser?—E. W. B., Appleton, Wisc.

Protecting Electric Lines From Moisture

QUESTION No. 1178: How can electric lines be run through cold storage rooms and freezers so as to avoid trouble with moisture accumulation and resulting deterioration?—E. R., Chicago.

News Notes and Chapter Activities

Busman's Holiday at KC — Ladies Shown Plant

KANSAS CITY—Many times an engineer's better-half has remarked that she would like to have her husband trade places with her for a day. Well, the Greater Kansas City Chapter met the girls half-way in that respect on February 19. A joint meeting was held with the wives. V. W. Crocker, chief engineer of the Federal Cold Storage, and Mrs. Crocker invited all the other wives to take a tour of the plant. The ladies were conducted through the engine room, the ice tank and ice storage rooms, and all of the cold storage rooms. Surprisingly they found the tour very interesting.

While the ladies were making their tour of inspection, the men were holding their usual discussions on the basic principles of refrigeration. This particular meeting being devoted to the chapter on compressors, the different types of refrigeration compressors were discussed as well as the action or details of what takes place inside the compressors when it is in operation. A typical indicator diagram showing the pressure cycle was thoroughly discussed and particularly the effect of head clearance and its effect on the volumetric efficiency.

At the conclusion of the instruction period F. E. Spencer of the Spencer Electric Renewal Parts Inc., gave a brief discourse on electricity. He explained the flow of current through a coil and how the magnetic field is established. He discussed some of the difficulties and remedies for

Dixie Officers Installed at New Orleans Social

At the January social at which Louisiana Chapter No. 2 customarily installs their officers, the 1957 elected leaders posed for this photograph. The new officers are, seated left to right Vernon Forst, publications committee; Frank L. Chase, national vice-president; Damian Fischer, retiring president; John N. Mariakis, president of the chapter; Leo J. Vivien, secretary; Carl Bosse, 3rd vice-president; George Whitman, treasurer. Standing, Jos. Vernaci, Jos. Copley, Joseph DeFraites, Eugene Orth, financial secretary; Ed. Dumaine, membership committee; Marion Olivier and John Funel, educational chairman.

these difficulties that are sometimes found in magnetic switches. Mr. Spencer gave a definition of Power Factor and how it affects the operation of various equipment in a plant. Ways and means of correcting low power factors were also discussed.

F. M. Robinson, assistant general manager of Railways Ice & Service Company, was a visitor as well as George Clarke of Inland Cold Storage and Ray Surbaugh, Railways Ice & Service Company in Topeka, Kansas. At the conclusion of the technical session members and guests rejoined the ladies and were served coffee, cokes and cakes.—JOHN MULLER.

Kern Co. Engineers Inspect College Air Conditioning

BAKERSFIELD—The new Bakersfield Chapter, NAPRE, undertook its first field trip on March 12. The central air conditioning plant at the new Bakersfield College was inspected by the group. The tour was conducted by C. D. Bryson, chief engineer at the college. A short business meeting preceded the tour. Three applicants were admitted to membership.

Mr. Bryson's plant at the Bakersfield College consisted of the newest and most efficient equipment in this area. Two 200-hp boilers on electronic controls and one 550-ton Carrier centrifugal package unit using "Carrene-2" refrigerant.

The main drive motor was of special interest, being a 515-hp wound-rotor variable-speed unit, motor speed drum-controlled. Air conditioning accomplished by hot and cold water circulated to the various buildings on the campus through service tunnels. All controls except the boiler were pneumatic. Mr. Bryson pointed out service connections and space for additional units in the future.—LEON STANFIELD.

50 Year Veteran Still Operates Plant

OGDEN, UTAH—Few men in NAPRE, or readers of *Industrial Refrigeration* for that matter, can match the record of J. A. Gealta, engineer for the Becker Products Company. This member recently corresponded with the national vice-president of NAPRE with regard to that officer's inquiry as to whether or not he would be interested in starting a Utah chapter. Here's what the gentleman wrote: "It might be of interest to you to know that I have been in the refrigerating game since 1892. I have spent most of my time since then in ice plants and breweries, having been with the Becker Breweries for the last 49 years. Lots of changes have been made in the industry since my start and a good many engineers come and go.

"I am going into my 80th year and am not too anxious to learn a lot or to gain much more experience. I think I'll let the other fellow do that. There is only one member of the NAPRE in our city that I know of and he can probably get a chapter going. He is a lot younger man and has the interest of NAPRE at heart.

"Thanks, however, for your nice letter which I read with interest. It is hoped the time may come when I can meet you personally. However, I do not travel around very much any more especially to conventions. For many years, I was a member of the National Association of Power Engineers and used to take in the conventions throughout the country. I think I have only attended one convention of the NAPRE and that was in New Orleans years ago."

Although NAPRE still has several dozen members with more than 30 years experience who are still active, and two or three who have 40 years in the game, it is the opinion of the vice-president of the Association that few of them can match Mr. Gealta's record. The Association would be interested in learning of engineers with such longevity, whether they are members or subscribers to IR.—R. T. BURNS.

New Leaders At Dallas

DALLAS—Officers for 1957 elected at the January meeting of Dallas NAPRE and installed in February are: President, Frank Fackler, chief engineer, Southern properties; Vice-president, Tom Weatherford, Jr., chief engineer, Texas Meat & Provision Co.; Secretary, W. A. Higgs, engineer, Proctor and Gamble, and Treasurer, Virgil E. Young, chief engineer, Alford Warehouses.

The chapter instructor is E. R. Hallowell, consulting engineer of Snell Refining Supply Co. The chapter holds its meetings on the first Monday of each month at the Alford Refrigerated Warehouse.

Improve service--sell more ice

with a high-capacity, low-cost LINK-BELT Ice Crusher-Slinger

TOP-ICED FRUITS, vegetables and other perishables reach market fresh and flavorful—retain nutritional values.

14,874

SHIPPERS, warehousemen, wholesalers of perishables offer you a source of profit for top-icing service. They must ice perishables to protect salability—en route or in storage. And there's no better way to get into this market than with a low-cost, high-capacity Link-Belt Ice Crusher-Slinger.

You have a choice of either portable or stationary types with gasoline engines or electric motors—capacities from 15 to 60 tons per hour. Ice particles are delivered uniformly to all corners and crevices for maximum protection. For complete information on Ice Crusher-Slingers see your nearest Link-Belt office. Or write for Book 2382.

LINK-BELT

ICE CRUSHER-SLINGERS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

California Discusses Ammonia Regenerators

SAN FRANCISCO—Prompted by an illustration in the July 1956 issue of INDUSTRIAL REFRIGERATION, a panel discussing the prevention of contamination in refrigerant systems, at California Chapter No. 1, in January devoted one portion of the evening seminar to ammonia regenerators. A number of participants in the discussion seemed to think that the term "ammonia regenerator" was a misapplication of title. Although the regenerator unit causes ammonia to be boiled off the refrigerant oil, from whence the NH_3 flows to the suction line and may then be reused in the system, the device is probably most useful for its function in collecting lubricating oil, water and sediment to a spot in the system where they can be readily removed. (See Fig. 1).

Reproductions of drawings used in construction of ammonia regenerators at the Pacific Fruit Express Company plants and in plants of the Golden State Company, Ltd., Division of Foremost Dairies, were distributed to the members in attendance at their NAPRE chapter meeting. Leroy Etzel, Superintendent of Refrigeration, PFE, provided the sketches from his firm and Frank Cordoza, Chief Engineer of the Golden State firm supplied the figures on their equipment (See Figs. 2 and 3).

Although practice varies from plant to plant as to the temperature of the water which flows through the jacket around the regenerators, it was apparent that regenerators under discussion operated on the same principle. Oil drains from oil traps and evaporators throughout the plants lead back to the regenerators. Heat from the compressor water jacket, generally, boils ammonia off the oil. In some plants an effort is made to reclaim the oil while in others the oil is wasted. Consensus of opinions expressed were along the line that the plant would have to be of considerable size and ample manpower, before reclaiming any refrigerant oil would become feasible.—CHARLES STEWART.

Winkler Instructs Northern Wisconsin Chapter

GREEN BAY, WIS.—Compressors, Chapter 6, *Basic Refrigeration*, was the principal topic of the NAPRE Chapter discussion at Green Bay on February 20. Lester Winkler volunteered to lead the discussion and thoroughly covered a good portion of this chapter particularly the significance of indicator diagrams. Answering of the questions in the Question Box was entered into in a lively manner by the entire group. This was our first full length session given to this type of activity and members were surprised to find how much benefit can be gained.

Winkler had previously served as chapter instructor for the January meeting. At that time a question came up in the Question Box which was referred to the national educational committee. This is Question No. 1165 which appears in the March issue of IR page 36.

The speaker for the January meeting was Ed. Sullivan, representative of the Sporlan Valve Company, St. Louis, Industrial Member of NAPRE. Sullivan discussed refrigerant controls with emphasis on expansion valves. He illustrated his discussion with slides.—J. B. SCHOUTEN.

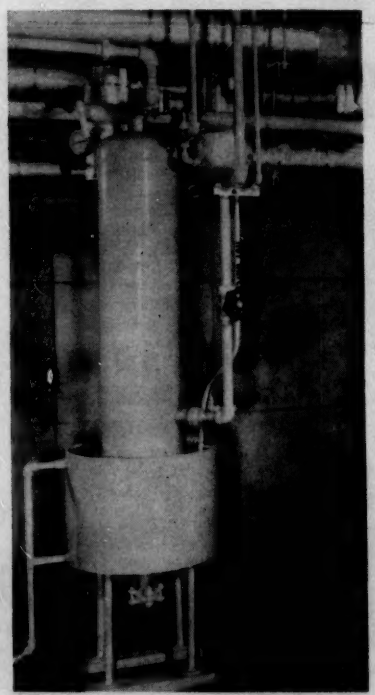


Fig. 1 — Typical NH_3 regenerator discussed. Oil drains from all evaporators to the regenerator. Heat from the compressor water jacket boils NH_3 off the oil which is wasted.

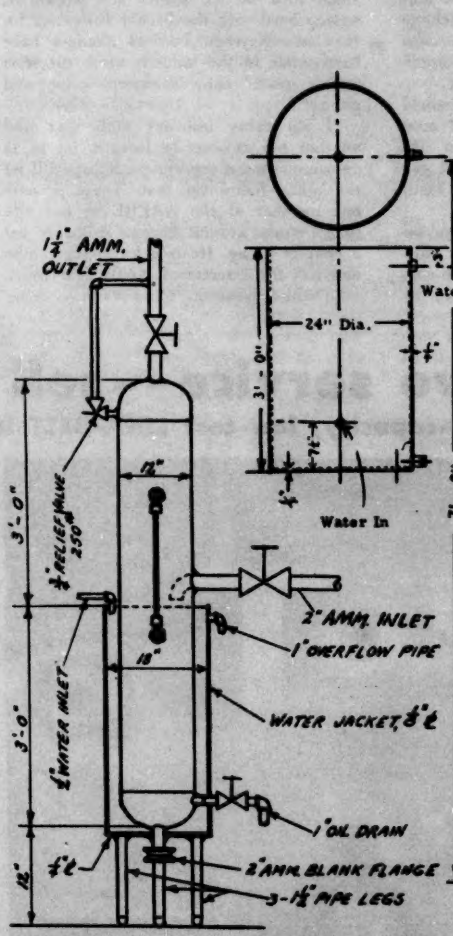


Fig. 2 (center) — Ammonia regenerator used by Golden State Ltd., Division of Foremost Dairies, Inc., in their Guerroro Street plant. Again an open type water jacket surrounds the lower half of the regenerating vessel.

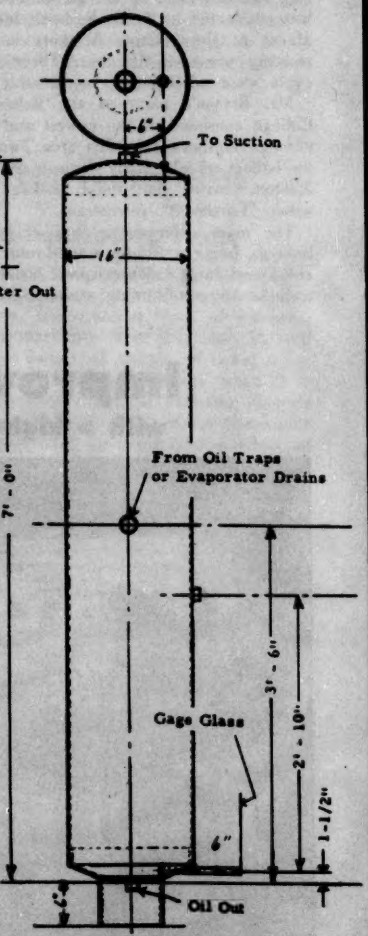
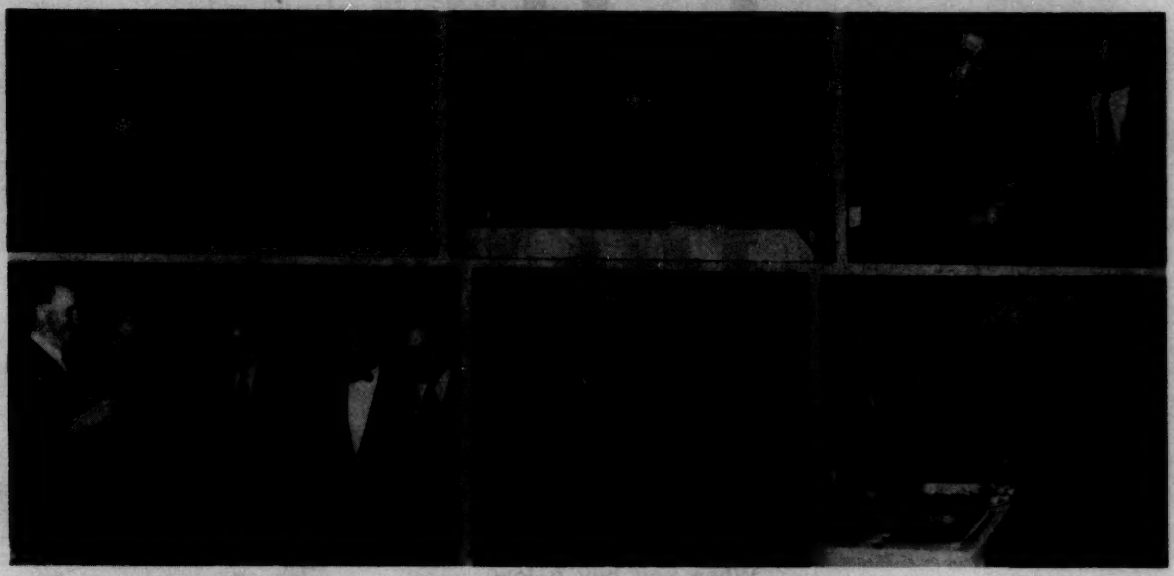


Fig. 3 (right) — The standard oil regenerator used by Pacific Fruit Express Company at their Sparks, Colton, North Platte and Council Bluffs plants. The pressure vessel which fits concentrically into the larger diameter, but open shorter steel water tank catches oil and other impurities.

NAPRE Chapter At Spokane Gets Under Way With Meeting Late in February



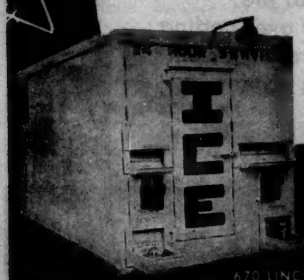
Late in February a new chapter was added to the growing list of NAPRE units. Spokane came into existence with a meeting of practical refrigerating engineers held at Sicks Spokane Brewery. Upper left, engineers forming the chapter pose for their first official picture. Top center, past president, NAPRE, Howard Peterson, instructs the protem officers: Dick Quam, President; Robert Brandvolt, sgt.-at-arms; August Mansfield, 2nd Vice-President. Other officers are Clifford H. Clapp, 1st Vice-president and W. G. Erickson, Secretary-Treasurer. At right, Howard Penor, chief engineer of Sicks Seattle Brewery, congratulates Dick Quam of Sicks Spokane Brewery on his election as president, protem of the Spokane group. Penor is junior past president of Seattle chapter. Lower left, NAPRE, national director, M. E. Bell, poses with Seattle and Yakima representatives. In addition to Bell and Penor at left, is pictured Bob Harrison, Boeing Airplane Co., instructor of the Seattle chapter, Howard H. Peterson, and a visitor from Peterson's office in Yakima. Center, members of the Spokane chapter relax following the meeting while at right other members replenish vitamins.

S&S

Stands for Service and Satisfaction

IN ICE VENDING EQUIPMENT

You can't do better than the best, and S&S has stood for the best for over 28 years. First in the field and still the finest, S&S offers in 1957 the greatest line ever. Three different types of bag ice venders to fit all needs across the country. Write for catalog and name of nearest well-informed sales representative.



S&S VENDING MACHINE COMPANY

670 LINCOLN AVE SAN JOSE CALIF

MASS PRODUCTION COSTS TOO HIGH?

Here's the ideal low-cost indicator for those hard-to-get-at places.

NEW "237" LIQUID EYE

Positive Sealing Indicator

(Illustrated 3/8" M. Fl. x 3/8" Fe. Fl.)

The new Allin "237" has all the proved Liquid Eye features plus:

- smaller — more compact — dependable. (about 1/3'd smaller in the 3/8" male to female size than any previous unit).
- complete self-contained accessory unit.
- new simplified design.
- available with 2 or 3 viewing ports.

Custom units can be made to your exact specifications. Consult Allin engineers now.

Write today for full information and catalog covering complete Allin line.

Allin

ALLIN MANUFACTURING CO.

N. Hermitage Ave. • Chicago 22, Illinois

Liquid Eyes Sold by Dists.

let's talk cents

When you buy a low temperature system and check the TOTAL costs of both the low and high side, you'll be pleased to find that

KRAMER (L) THERMOBANK

COSTS NO MORE...

and you get so much more

ONLY.. *THERMOBANK* provides positive reevaporator with ample heat supply.

ONLY.. *THERMOBANK* completely protects the compressor — no liquid refrigerant to the compressor, no oil foaming, no motor overload.

ONLY.. *THERMOBANK* makes possible the use of the "Low Temperature" compressor without overloading during defrost, making possible serious reductions in first cost as well as significant operating economies.

WRITE FOR MANUAL TV-320

KRAMER TRENTON CO. • Trenton 5, N.J.

43 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

Refrigerated Food Handling Discussed at Los Angeles NAPRE Meeting

LOS ANGELES—Deviations from refrigerating plant machinery and system topics often prove to be a refreshing break in routine. However, they also have the added advantage of giving the engineer a little better understanding of the other employee's tasks. This proved to be the case at California No. 2 Chapter, NAPRE, recently.

Regis Gubser, Vice-president and chief engineer, California Consumers Corp. Los Angeles, presented a talk, illustrated with slides, on "Material Handling In Cold Storage and Food Plants" at the February 20 meeting of Los Angeles Chapter, NAPRE, in the Terminal Club. His presentation, in which he was assisted by California Consumers engineers George Paulick and Mike Julius, was offered in four parts:

(1) A definition of warehousing functions, and a review of the origin and development of refrigerated storage warehousing;

(2) A description of different types of warehouses, and the specific functions to which they are confined;

(3) A discussion of the stacking and handling methods common to each type of warehouse operation; and

(4) A slide presentation showing views inside and out of various warehouses and food plants operated in Southern California. (Gubser presented the descriptive commentary for the slide views).

The stacking iron designed by California Consumers' engineers and used in the company's operations to prevent crushing of bottom-layer cartons in three-tier stacks inspired numerous questions from the floor. Gubser explained that in one of his firm's warehouses, where three tiers of palleted merchandise in corrugated cartons was stacked to near ceiling height, the weight of the upper pallet loads had a tendency to crush the lower-level cartons. Since space was valuable, the problem invited some other solution to prevent damage to cartons than lower stacking.

Originally (when the crushing occurred) the cartons were stacked on conventional pallets, with the runners of pallet number 2 resting on the top cartons of No. 1, and No. 3 pallet on the top of No. 2. To relieve the weight pressure on the lower tier of cartons, the company designed some special steel stacking irons or rods. They are constructed of steel angle uprights 3/16" thick, 2½" x 2½", and 74" high, with a ¼" x 4" x 4" plate attached horizontally at the bottom.

Installed, the plate is slipped under the lower-most pallet (for rigidity), with the upper end fitting under the pallet No. 2, thus providing support for pallets 2 and 3 and taking their direct weight off the No. 1 unit and its cartons. The second pallet in the tier needs no stacking irons, Gubser explained, because it has been found that its cartons will carry two tiers.

Foresees Radio Intercoms

An interesting point was brought out during the Question and Answer period following the talk. It related to a warehouse dispatching system which Gubser remarked could be practical in the industry. He envisioned a terminal warehouse of the future in a large city where frequent withdrawals are the order of the day. Warehouses that are spread over a block or more Gubser pointed out, could well use time-saving intercommunicating systems for more efficient use of man-power.

He pictured a dispatcher's desk near the warehouse receiving and out-going docks and a short wave radio dispatching system on the order of that used today by taxicab companies. The warehouse fork-lift or material handling trucks would be equipped with two-way radios. When a customer or dray-firm arrived at the dock to pick up a certain lot of merchandise, the dispatcher would look up the location of the goods. Instead of sending another warehouseman from the dock area to get the goods which might be stacked up in a cooler room a block away, he would radio-contact a workman whom he knows to be in the near vicinity of the stored goods.

Gubser pictured the ensuing conversation somewhat as follows:

Dispatcher: "Joe, what are you doing right now?"

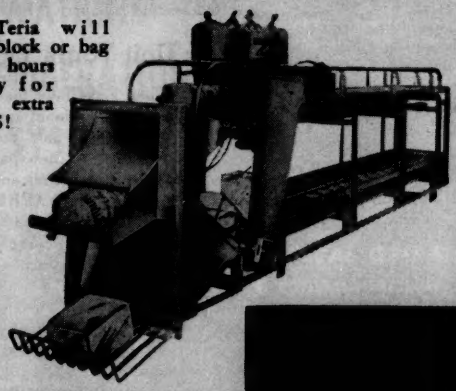
Joe: "I'm stacking those cases of tuna from the Smith Fish Co."

Dispatcher: "Well, drop that for a moment, Joe, and hustle over eight cases of frozen egg yolks from Freezer Room No.

ICE-A-TERIA

ICE VENDORS FOR EVERY REQUIREMENT

Ice-A-Teria will vend block or bag ice 24 hours a day for those extra SALES!



NEW BAGGER-WEIGHER

Model 150-B, designed for fast operation, the twin spouts let the operator remove one bag and replace with an empty. The second bag on the weighing platform has filled, the weight has stopped the machine. The minute the operator removes the filled bag, the scales move upward and starts the mechanism filling the second bag. The operator has only to move the flap in the dividing head the second he has installed the empty bag, this must be done before removal of full bag.

Model 150-B

PERFECTION Ice Scoring Machine Co.

P.O. Box 2140 Fort Worth, Texas

FASTER FREEZING RATE

preserves food flavor, color, texture

More rapid freezing and engineered distribution of turbulent frigid air throughout the system assures you maximum retention of product quality. Losses through "drying out," desiccation and bacterial activity are prevented by proper sizing of units. In addition, King systems give you increased cold room capacity, continuous operation with no defrosting shut downs, lower power and maintenance costs. Whatever the type or size of your plant, a King system can be designed for your specific freezing needs by our experienced engineers.

Write for technical bulletins. More than 50 years experience is at your disposal.

THE King CO. OF OWATONNA

907 NORTH CEDAR ST. OWATONNA, MINNESOTA

A New Answer to Wall Finishing Problems

Swift's ADCOTE

Adhesive Finish

ADCOTE is a new type of wall finish developed by Swift & Company to solve finishing problems for a variety of types of walls.

While Adcote was originally developed for use on insulation in low temperature freezer and cooler rooms, tests have indicated it is also a superior finish for concrete, brick and dry wall construction. Contractors who have used it have been particularly pleased with the ten advantages Adcote provides:

1. GOOD COLOR STABILITY
2. EASE OF APPLICATION
3. HIGH STRENGTH
4. GOOD MOISTURE RESISTANCE
5. LOW VAPOR TRANSMISSION RATE
6. GOOD CHEMICAL RESISTANCE
7. GOOD VERMIN AND RODENT RESISTANCE
8. MOLD RESISTANCE
9. FIRE RETARDANT
10. WASHABILITY

To get full information write for the new Adcote descriptive bulletin. And ask how you may test Adcote under your own conditions. SWIFT & COMPANY, Adhesive Products Dept., Chicago 9, Illinois.

Swift

To Serve Your Industry Better

Three, Stack No. Four, Consignment No. 3018."

The lot of goods would get to the dock and into the pick-up truck in half the time that would be required by sending a man all the way across the big warehouse and back, according to Gubser.

Circulation Clearances

The subject of how to use the space between wall and product also came in for some discussion. One member recommended stacking at least 6 to 8 inches from the wall at bottom of the stack so the top cases will not tilt into actual contact with the wall. Some firms, it developed, build an actual lattice work against the wall to prevent contact of the product with the wall which would interfere with air circulation.

"If the workmen are well-trained, they will not stack goods directly against a wall", Gubser remarked. "Our old-timers, who know the warehousing business, would never permit contact between product and wall."

Power Handling Equipment

In terminal warehouses, the speaker explained, it is common practice to use hand-operated, 4-wheel power trucks. In a terminal warehouse, where large quantities of merchandise is loaded on pallets, fork-trucks are an essential, he said, to move about the wide-spread floor areas. He cited ride-type equipment as the most effective for one-floor warehouses. Handling operations in multi-story warehouses, according to Gubser, depends on the size of elevators to some extent, and conditions might dictate the use of walk-type trucks instead of motor-powered ride trucks.

"Electric powered carriers," Gubser declared, "are very practical and the most commonly used today in refrigerated warehouses. Gas powered units sometimes have a deleterious effect on the product from the gas fumes. However, gas trucks can be used safely in freezer rooms if the room is large and well ventilated. But, it is not common practice to use them today."

Hand stacking is frequently employed in terminal warehouses, the speaker commented, rather than pallet stacking, because hand-stacking takes up less room. Small lots of merchandise, he said, are usually hand-stacked.

In respect to conveyor handling, Gubser stated that a private warehouse could use a conveyor system to good advantage. A conveyor system, however, could be impractical in a terminal warehouse. In private warehouse operations a whole room is sometimes loaded at one time and left that way for long periods. This would make conveyorizing economically practical for that type of operation, since the conveyors would have to be moved into position only on rare occasions.

Multi- Vs One-Level Building

Gubser said that the question is sometimes asked: which is the best design for a warehouse, single- or multi-story?

That is a difficult question to answer, he explained. It depends on too many factors. Multi-story warehouses are not yet exactly a thing of the past. Land values in the larger cities are very high, and that is one factor which sometimes offsets other factors in favor of one story structures.

A modification of the single-story type might be the answer, Gubser declared. He described a single-story warehouse now on the drawing boards of California Consumers Corp. It is planned basically as a single-story structure, 280 x 380 feet, intended for a terminal warehousing operation and the storing of miscellaneous lots of perishable merchandise. Walking type handling equipment, Gubser said, would not be practical because of the distances involved, so ride-type carriers have been ear-marked. A departure from both the one-story and multi-story design is represented in the plans by a 120' x 240' two-story section in the center of the building. This will make the new warehouse, in effect, a one-story structure with a mezzanine in the center.

At the March 6 meeting, President Victor A. Stubblefield welcomed four new members into the chapter: James McEbetee and Roger C. Scott of Yale & Towne Mfg. Co.; Charles Melnick of Shriners Hospital; and Ralph K. Boulanger. It was announced that the chapter's regular meeting on Wednesday, May 8, had been moved up a day and transferred from the Terminal Club to the Shrine Auditorium on May 7. The NAPRE will conduct its meeting that night in the form of a quiz program as part of the program of the conference and exhibit on air conditioning, heating, ventilating and refrigeration to be held that week.

A group of Los Angeles chapter members, including president Stubblefield, and Past National President Regis Gubser, motored to Bakersfield, Calif., in mid-March to lend a hand to refrigeration men in the San Joaquin Valley in forming a Bakersfield Chapter.—FRED HERR.

Florida Unit Tours Typhoon

TAMPA—When a typhoon tours Florida it shouldn't make exceptional news in the trade press, judging from the annual ruckus that out-of-state newspapers and wire services give the hurricane season. However, when a Florida NAPRE Chapter tours Typhoon — that is trade journal news. Instead of having the regular meeting Jan. 14, the Tampa Chapter accepted an invitation from the Typhoon Heat Pump Company, Division of Hupp Corp., to inspect their plant and observe the actual production of the Typhoon "Prop-R-Temp" heat pumps.

Members and guests met in the shipping and receiving department, and were divided into small groups so more could be gained from the tour. The first department visited was the coil department where the unique patented "hour glass evaporator coil" is made. Because this coil has to be used both as an evaporator and a condenser, the coil is all copper. This gives the high heat dissipation to the air during the heating cycle that is so necessary for heat pump operation.

In the manufacture of this coil, the first operation is putting continuous copper fins on soft type L copper tube. This is done with an automatic finning machine

that spaces the fins nine to the inch. It bonds the fins to the tube by spraying molten tin on the tube and fins after they have passed through an acid flux. The finned tubing then is passed through a brush type cleaner to reclaim the surplus tin, and then through a water bath to set the metallic bond. While the tube is still warm it is rolled on a forming mandrel shaping a finished section of the coil. Four sections made on the forming mandrel are then joined together for the finished coil — a coil with only six joints.

Next visited was the condenser department. Again, the visitors were surprised by the method of manufacture of the condenser. The condenser is a multiple tube in tube that is again formed on a mandrel with precut lengths of tubing. The complete tubing that comes in contact with water on the heat pump is Admiralty metal and can be used on most types of water encountered from ground heat sources. All of the condensers, as well as the evaporators then are pressure tested at 500 psi, air.

Assembly Line Methods Used

The tour continued to the assembly area. There are three assembly lines; one for the assembly of the two- and three-ton water-to-air heat pumps, one for the six-ton water-to-air unit, and the third one for the three-and five-ton air-to-air heat pumps. Following the lines, "tourists" watched how the pre-assembled parts were installed, and how the finished heat pump cycle was tested for leaks, dehydrated in the thermostatic controlled ovens, charged, and run through a complete test for operation of the unit according to factory standards and ratings.

In the electric department, all controls are assembled and installed in the completed unit after the cycles have been placed in the cabinets. In this same area the three-way change-over valves are manufactured and tested. Next department in the assembly area was the large unitary section where the large heat pumps are manufactured. Visitors saw some 10-ton heat pumps in different stages of assembly, and then visited the large unit test room where there are facilities to test the largest heat pumps which Typhoon manufactures. Such units are rated at thirty-tons in one package, in the water-to-air line, and forty-tons in the water-to-water heat pumps.

Finally, all visited the test laboratory where a five-ton air-to-air heat pump was in the insulated test room (operating at 10 degrees F), and operating data on the pump itself was being accumulated. After the tour came refreshments. All then expressed an opinion that the group had a much better knowledge of the heat pump, and were much surprised that the basic manufacturing was being done locally. Members are also proud that the largest exclusive heat pump manufacturer in the world is located here in Tampa. All expressed thanks to Typhoon that they were given the chance to see the advancement of this new phase of our industry.—JOHN HOLZBERGER.

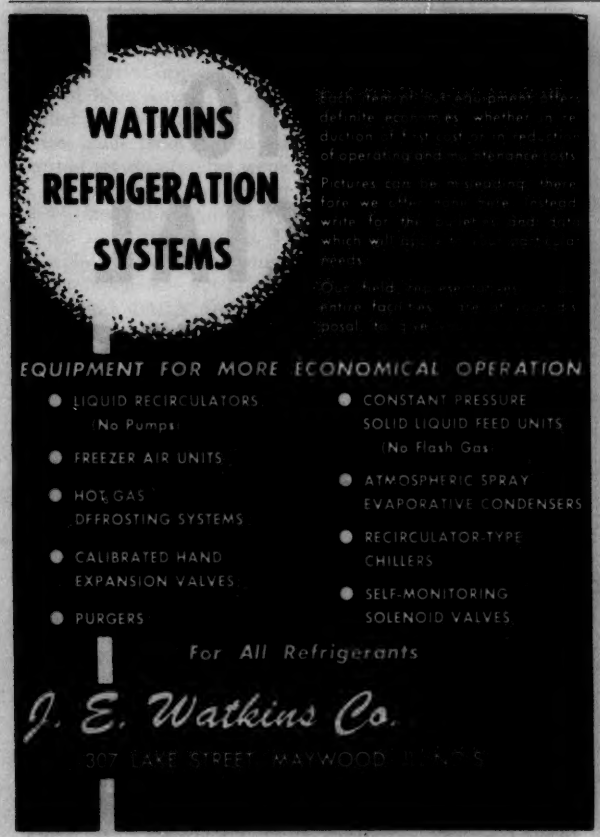
Instruments & Evaporators Tennessee March Topic

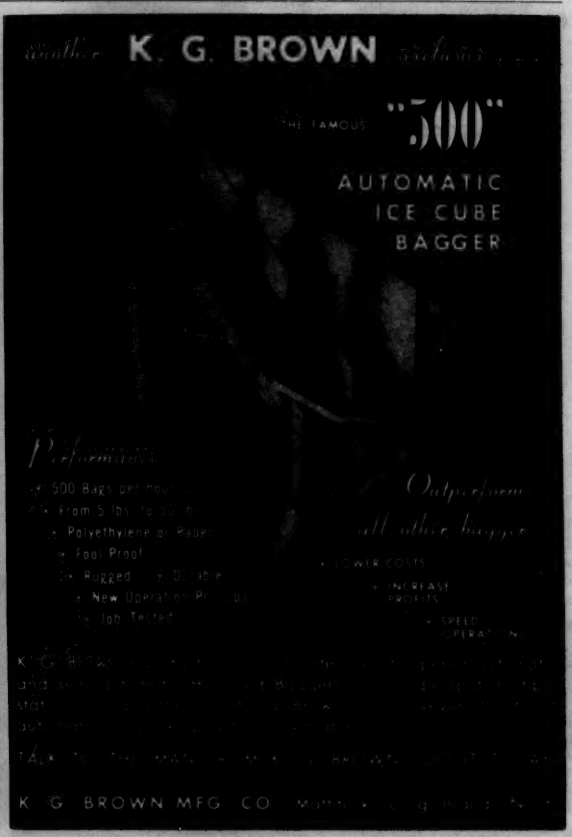
MEMPHIS—Cut-away props were used by instructor H. L. Todd to punctuate his discussion at the March 20 meeting of Tennessee Chapter No. 1, NAPRE. As he does habitually, Todd brought a number of visual aids to class with him in the way of gauges, thermometers, and even cut-aways of recording thermometers and recording controllers.

At the earlier March meeting Todd instructed the members on various types of evaporators. As is his practice, he combined a chalk talk with the discussion, illustrating coil lay-out, showing the operation of flooded and gravity types and ammonia recirculation systems. Baffling of coils came in for discussion. CHAS. CONLEY.

New Leaders at Olympia

OLYMPIA—Officers for 1957 elected at the January meeting of Olympia Chapter NAPRE, and installed in February are: President, Falconer Anderson, Chief Engineer, Olympia Brewing Company; Vice-president, Hoffer Jensen, engineer, Port of Olympia Cold Storage; Secretary-Treasurer, Roy D. Madison, engineer, Olympia Brewing Company, and Sgt.-at-Arms, Warren M. Dibble, welder foreman, Olympia Brewing Company. The Board of Directors are Everett Ticknor, Jerome Wiest and Eugene M. Pratt. The chapter holds its meetings on the third Tuesday of each month at the Olympia Brewing Company.— R. D. MADISON.

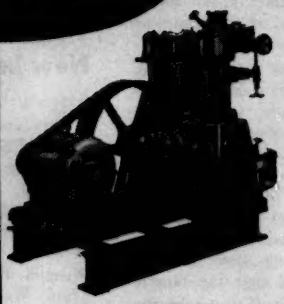




Your Best Single Source for
REFRIGERATION
AMMONIA COMPONENTS
FROM MANUFACTURER TO CONTRACTOR

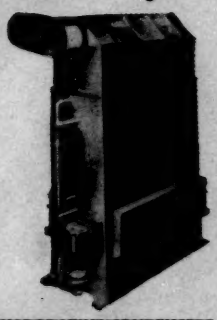
HOWE

COMPRESSORS
5 to 150 Tons
ACCUMULATORS
BRINE COOLERS
FIN & PIPE COILS
CONDENSERS
Evaporator, Double Pipe, Shell and Tube
SURGE DRUMS
UNIT COOLERS
FLAKE ICE MAKERS
1 to 10 tons
RECEIVERS
PRESSURE VESSELS
Fabricated to order



MODEL D IN SIZES
from 25 to 150-ton capacity

RAPID FREEZE UNIT COOLER
Designed for blast and freezer storage



EVAPORATIVE CONDENSERS
10-ton to 200-ton capacity

HOWE'S custom-order fabrication shop is especially set up to produce quality ammonia components that meet exact industry requirements. Pressure vessels are built to ASME code standards. Shop flexibility gives you volume quantity prices on small quantity purchases, along with deliveries that meet your schedules. Consult Howe today — no obligation.

HOWE ICE MACHINE CO.

CONTRACTORS-DISTRIBUTORS— Several exclusive territories still open. Your inquiry invited.

2829 MONTROSE AVENUE • CHICAGO 18, ILLINOIS
Distributors in Principal Cities. Cable Address: HIMCO Chicago

Saturated Fats and Refrigeration

UNDOUBTEDLY, every one or nearly everyone has read or heard something about the subject of saturated vs. unsaturated fats in the diet. A great deal of publicity has broken about the subject, and, of course, speculation follows closely. One writer has pointed out that if the guessing is borne out, a number of foods will be affected. Perhaps others have called attention to the same implications, for they are quite apparent. Unsaturated fats are less stable than saturated, and if the former are used more, changes in handling, such as more use of refrigeration and faster turnover, may come about.

There is no definite and conclusive evidence on this matter, however, and it is well to remember Dr. C. G. King's statement that "There is definite interest in this subject. How effective unsaturated fats will be in lessening the incidence of heart disease cannot be predicted from present evidence." Of course this subject is receiving the attention of highly competent scientists, and undoubtedly they will require a long time to reach thorough and competent conclusions.

A news item from Norfolk, Va., tells a story of a doctor's statement that frozen foods are linked with heart attacks. To an inquiry about this wholly unwarranted statement, addressed by H. P. Schmitt, Research Director of National Association of Frozen Food Packers to Dr. C. G. King, Executive Director of the Nutrition Foundation, the latter replied, for quotation: "The suggestion made by Dr. Doles is completely without evidence. On the contrary, there is substantial evidence that his theory is untenable and ridiculous. For example, Vitamin K is relatively stable in frozen foods and the frozen vegetables are among the best sources of this nutrient."

OHIO SPECIAL ICE CANS

WELDED — RIVETED
ICE CAN GRIDS

Industrial Trucks
and Trailers

THE OHIO GALVANIZING & MFG. CO.
NILES OHIO

Pallet Fire Warning

A STACK of wooden pallets is almost a perfect potential bonfire according to Modern Materials Handling. Any stack of empty pallets which is more than 5 feet high and catches fire is not only extremely difficult to extinguish, but is almost certain to ignite the roof or the floor above.

The layman might never regard a frozen food warehouse as a source of possible fire. Yet underwriters consider it a moderately high risk. The extreme cold freezes out the moisture in the air, so that the atmosphere is quite dry. There is a lot of parraffin wax on packages, and usually lots of waxed paper, cardboard, and perhaps sugar and fats, all excellent fuels. In addition, the sprinkler system is more liable to freeze-up or fail to operate.

Good practice dictates that there shall be sufficient space between stacks to permit penetration of water, and that stacks are kept low enough to permit free space of three, possibly four feet between top of stack and sprinkler head. Palletized inert materials can — and do — burn. In one test fire, palletized loads of empty steel drums burned so fiercely that the ensuing heat would have destroyed almost any warehouse.—TRRF Bulletin.

Effect of Heat and Storage On Frozen Milk

THE stability of milk proteins in frozen storage was found to be influenced by the degree of heat treatment to which the milk was subjected prior to freezing. A heat treatment of 100 to 150 F for 30 min had a stabilizing effect while 180 F for 30 min had a marked destabilizing effect on the proteins. The stabilizing effect was explained by the destruction of nuclei that promote lactose crystallization. The destabilizing effect of severe heat treatment appeared to be directly related to the presence of heat denatured serum protein. This was demonstrated by the stability of raw casein resuspended in a serum made from heated milk. In such case the heat denatured serum proteins would be removed with the casein in the process of making the serum. Holding the raw or pasteurized milk prior to freezing had a deleterious effect on the stability of casein. This effect was found difficult to explain, but was presumed to be due to the formation of heterogeneous nuclei during the holding period. Experimental details are given on the performance of all variables and the test used for storage life.—Refrigeration Abstracts.

Freezing Plant Adds Warehouse Space

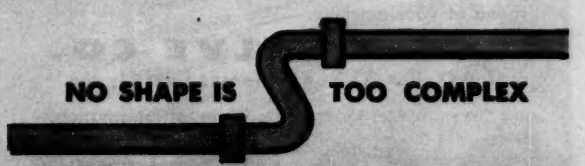
THE Turlock Refrigerating Company, Turlock, Calif., has authorization of the state public utilities commission to issue a promissory note for $80,000 to finance an addition to its warehouse structure. In its application the company said it has 864,000 cubic feet of storage space, but its facilities are inadequate to serve customers in the area. A considerable tonnage of perishable merchandise had to be hauled as much as 80 miles the past season in order to find storage space.

The company plans to add 200,000 cubic feet of space to its plant by building the warehouse addition. The structure will be erected on land already under first deed of trust to the Bank of America. Financial statements filed by the company indicate its business has been increasing rapidly with gross revenues of $175,629 in 1954, $244,233 in 1955 and $391,881 in 1956.

GENUINE
OZITE®
the perfect
PIPE COVERING
INSULATION

- Maintains uniform temperature
- Increases refrigerating capacity of the equipment
- Reduces power consumption
- Never rots or decays

The quickest, easiest way to stop wasteful heat absorption is to cover all pipes and ducts with OZITE Standard Hair Felt. It gives better insulation because it is made from 100% genuine cattle hair, nature's own insulation.



a product of
AMERICAN HAIR & FELT COMPANY
MERCHANDISE MART • CHICAGO 54, ILL.

ANNOUNCING
THE GREATEST ADVANCE IN GAS COMPRESSOR VALVES IN 35 YEARS
New BALL VALVE

INCREASES THE PERFORMANCE OF ANY COMPRESSOR—OLD OR NEW
In the Ball Valve, multiple steel balls replace the flat "plate" or "poppet"—resulting in less resistance, better seating, far greater life and improved performance.

EASILY TAKEN APART FOR INSPECTION
CAN BE INSTALLED IN 3 MINUTES
QUIETER, TROUBLE-FREE OPERATION
NO CASTINGS, MACHINED FROM SOLID STOCK

LESS RESISTANCE—BETTER PERFORMANCE
Gas flows freely around a ball—providing maximum flow, minimum friction. Note how the air flow is deflected by a plate, creating turbulence and friction.

LESS WEAR—LONGER LIFE
Ball revolves, seating on a different part of its surface with each piston stroke. Ring plate always seats in same place, thus shortening valve life.

PASSES 26% MORE VOLUME THAN PLATE VALVE*
*According to tests of a leading independent, non-profit research organization. In the Ball Valve, greater free area is obtained without sacrificing structural rigidity.

For information on improving your compressor performance, send us the name, bore, stroke and speed of your machine.

BALL VALVE CO.
P.O. Box 53 • Kansas City 41, Mo.

Some franchise territories open. Write for information.

VALVES CARRIED IN STOCK FOR LEADING HEAVY DUTY COMPRESSORS

Controlled Atmospheric Environment Publication List Offered

MORE THAN 700 publications by staff members of the Colleges of Agriculture, Engineering, Fine and Applied Arts, Liberal Arts and Sciences, Veterinary Medicine, Medicine, and the School of Physical Education of the University of Illinois and the State Natural History Survey Division are listed in the bibliography and a commemorative brochure were prepared for the informal reception and dinner for Dr. A. C. Willard, Professor of Heating and Ventilating and President, Emeritus, University of Illinois, and four former associates. The dinner was held in Chicago, February 27, 1957, at the Conrad Hilton Hotel at the time of the annual meeting of the American Society of Refrigerating and Air Conditioning Engineers.

The commemorative brochure not only describes the activities and honors which have been bestowed on Arthur Curtis Willard, but also honors his associates Raymond Bernard Allen, Robert Wood Keeton, Alonzo Plumsted Kratz and Harold Hanson Mitchell. Allen is Chancellor of the University of California at Los Angeles, the other three professors are with the University of Illinois.

A reference list compiled by the Physical Environment Unit, University of Illinois with the aid of various divisions of the University of Illinois and the State Natural History Survey Division deals with the controlled atmospheric environment in relation to people, animals and plants. Among papers listed in this bibliography is Liquid Ammonia Recirculation and Return Systems" by W. F. Stoecker, which appeared in INDUSTRIAL REFRIGERATION in November and December 1955. There are some 48 papers and bulletins on refrigeration listed in this work, together with a listing of books on refrigeration and air conditioning. The papers by W. F. Stoecker are available from Nickerson & Collins Co., Chicago.

Carrier-Elliott Merger

A NEWS report states that Carrier Corp. and Elliott Company have announced agreement on terms to merge Elliott into Carrier. The announcement was made by Cloud Wampler, chairman of Carrier, and William Elliott, president of Elliott. Carrier, with headquarters in Syracuse, is a large producer of air conditioning and industrial refrigeration. It uses equipment manufactured by Elliott. Elliott, with executive offices in Jeannette, Pa., is a leading manufacturer of steam turbines, heat transfer apparatus and other types of industrial equipment.

Under terms of the agreement holders of each share of common stock of Elliott will be offered 65-100 of a share of common stock of Carrier. Holders of each share of Elliott 5 per cent cumulative preferred stock will be offered 1 2-10 shares of Carrier Corp. 4½ percent preferred stock present series. The companies said it was expected holders of the five percent second convertible preferred of Elliott will be converted into Elliott common and then exchanged for Carrier common on the basis of the merger terms.

Observers called the completed merger a "natural," since Carrier has been an Elliott customer for some time, buying motors for use in its refrigeration equipment from the Pennsylvania concern. On the New York Stock Exchange, reports of the merger previously sent Carrier common to 62¼, up 2¼ for the day, and Elliott common to 34-7/8, a gain of 2-1/8 for the day.

COMING CONVENTIONS

GEORGIA ICE MANUFACTURERS ASSOCIATION
May 5-6, 1957
Henry Grady Hotel, Atlanta, Ga.
Mildred Nichols, Secretary

AIR CONDITIONING & REFRIGERATION INSTITUTE
May 5-8, 1957
The Homestead, Hot Springs, Va.

CANADIAN WAREHOUSESMEN'S ASSOCIATION
May 13-16, 1957
Harrison Hot Springs Hotel
Harrison Hot Springs, British Columbia

AMERICAN SOCIETY REFRIGERATING ENGINEERS
June 2-5, 1957
Hotel Fontainebleau, Miami Beach, Fla.
R. C. Cross, Executive-Secretary.

WESTERN PLANT MAINTENANCE & ENGINEERING
June 11-13, 1957
Civic Auditorium, San Francisco, Calif.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS
November 14-16, 1957
Shoreland Hotel, Chicago
R. C. Cross, Executive Secretary, New York City

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS
November 18-21, 1957
Hotels Del Prado & Sherry, Chicago
J. R. Kelahan, Secretary

AIR CONDITIONING & REFRIGERATION EXPOSITION
November 18-21, 1957
International Amphitheatre, Chicago, Ill.
George Mills, Show Director.

FRICK

High-pressure Valves & Fittings

Large handwheel

Long oversized stem

Ample packing

One-piece collar box and bonnet

Back seat permits repacking in use

High-angle seat insures tightness

Standard flanges: screwed sizes to 2"

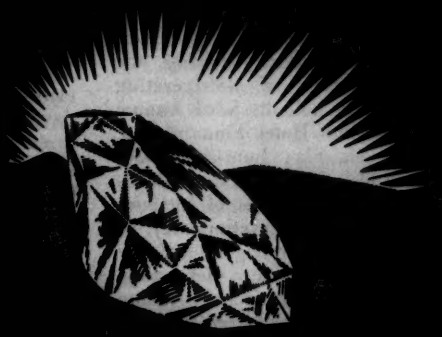
Full opening; developed for heavy duty

Are preferred for high-pressure services, 300 to 1500 lb., 300 degrees. Sizes ¼" thru 14". Stocked by Frick Distributors, the world over. Get new catalog with prices, weight, dimensions, working pressures, parts and useful tables.

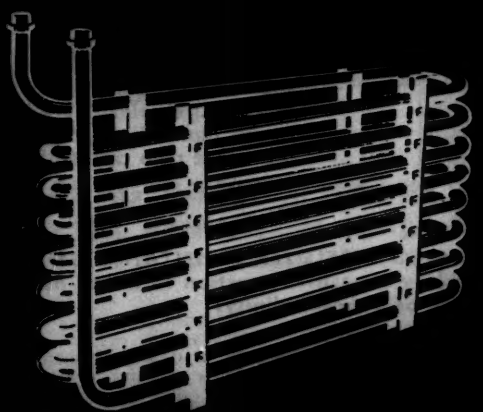
Frick line includes fittings, safety valves, gauge glasses, return bends, manifolds and welded work.

WAYNESBORO, PENNA., U.S.A.
FRICK CO.

75th Year



NATIONAL QUALITY



NATIONAL QUALITY
NATIONAL PIPE BENDING CO.
RIVER ST. • NEW HAVEN, CONN.

ASRE, 53rd Annual Meeting At Miami Beach, June 3-5

FEATURING four technical sessions, three engineering conferences and six industry forums, the American Society of Refrigerating Engineers will hold its 53rd Annual Meeting at the Hotel Fontainbleau, Miami Beach, Fla., June 3-5, 1957. Tentative technical program includes authoritative discussions of methods by which food preservation may be improved in home refrigerators, new principles for automatic defrosting, and compressors for aircraft. Among other topics to be covered are: Refrigeration techniques allied with extremely low temperatures, transfer rates from heated horizontal tubes, electrical insulation as related to the hermetic motor.

There will be a research conference upon the mechanics and chemistry of hermetic systems, another upon ways to reduce residential heating and cooling costs and a third on controls for household refrigerators and freezers.

Other planned activities include: Inspection trips, social events and resort and beach entertainment. Among these is an evening get-together at the Fontainbleau on Monday, June 3.

North Carolina Ice Meet

THE 48th annual convention of the North Carolina Ice Association was held at the Washington Duke Hotel, Durham, N.C. March 18-19. New officers were installed at the closing luncheon session held Tuesday. The final business session featured a discussion dealing with mutual problems faced by ice dealers on management, operations, sales and service.

J. Mark Freemon of Burlington, presided over the business session and the moderator for the panel discussion was D. M. Howell of Greensboro, director of the National Ice Association. Participating in the discussion was C. P. Austin of Washington, director of research and marketing of the National Ice Association.

Dr. Hal J. Rollins of Raleigh, veterinarian in the State Department of Agriculture, and Maj. Charles A. Speed of Raleigh, director of the highway safety division of the State Department of Motor Vehicles, appeared on the program as speakers. Dr. Rollins discussed the poultry business in the state, and Major Speed spoke on the 1957 legislative program of the State Department of Motor Vehicles. The balance of the program were industry speakers.

The annual banquet was held Monday evening.

Officers for the new year are:

President, V. E. Boomer, Rich Square.

Vice-President, J.H. Lane, Charlotte.

Secretary-Treasurer, Lewis H. Powell, Raleigh.

Give Synchronous Drives Their Proper Care

(Continued from page 42)

across the brushholders. The ohmmeter should show continuity through the field discharge resistor and with the ohm-meter still across the brushholders, the field contactor should be closed. This allows the ohm-meter to read continuity through the exciter. If the ohmmeter shows an open circuit during this check, a correction should be made before starting. Failure to do so, may result in severe damage to the rotor, the switchboard or both. Later motors have a spark gap provided on the slip rings (Fig 11) but most of the older ones do not have this protection.

After the control has been checked and motor and exciter are completely assembled, connected up and ready to go, a final careful inspection should be made to be sure that all tools, rags or other inappropriate material have been removed from the interior or close proximity to the machine. It is suggested that the compressor by-pass valves be opened and that the motor be barred over a few times as a final precautionary check. Then close the disconnects, push the start button, let the motor come up to speed and synchronize with ample excitation applied. Adjust excitation to name-plate value and observe operation for a few moments. Then, either load the machine in normal fashion or shut down until operating schedule requires the return of the unit to normal usage.

Locker Short Course

A SHORT course for locker plant operators in Virginia will be held at Virginia Polytechnic Institute July 7-11. First of its kind in Virginia the event will be primarily of interest to owners or managers of locker plants. Topics to be discussed include general sanitation, keeping books, pricing products and services, refrigeration problems and solutions, meat cutting, insect and pest control, and developing trade. Details are available from Dr. Robert F. Kelly, department of animal husbandry, VPI, Blacksburg, Va.

Distilled Water? No . . . DISTILEX

Distilex renders raw water the same as distilled water for ice making, and increases tonnage production by decreasing the number of hours required to freeze untreated water.

Distilex, safe and easy to use, prevents white butts, and eliminates cracking while ice is being frozen, dumped or cut. Economical—Distilex costs less to use than cracked bar losses.

THE CSCO STABLEIZER MAINTAINS GOOD BRINE by a positive reaction to either over-acidity or over-alkalinity!

The CSCO STABLEIZER removes destructive material from the brine without adding harmful chemicals. Easily installed in all systems. No other brine treatment compares in safety. The STABLEIZER helps keep brine safe for workmen's hands . . . protects and preserves expensive equipment!

Write for complete information on these aids to better ice making and cooling, manufactured by the Chemical Solvent Company — makers of quality products for decades.

CHEMICAL SOLVENT CO.

P. O. Box 487 Birmingham, Ala.

Production Started on New Ice Industry Film

THE EXECUTIVE Committee of the National Association of Ice Industries at its meeting in January approved funds for making a 28½-minute full-color film suitable for television, club meetings, and group showings. A contract has been signed with Constellation Productions, Inc., of Washington, D.C., to produce the film. The story treatment has already been prepared. It was discussed and approved by the Sales and Marketing Committee at a meeting in Washington, March 4. The script is now being prepared, and the photographic work will be done during the summer. The film is to be educational in nature. It will point up the romantic aspects of the industry with emphasis on new developments.

At the meeting of the NAII Board of Directors last summer, the Sales and Marketing Committee proposed that the Board give thoughtful consideration to making a new up-to-date institutional film of the Ice Industry. The Committee felt that the industry is not getting its story over to the public. It was recognized that some icemen are doing a good job with local advertising. Others, for want of merchandising tools, are doing so little promotional work that the products and services of the industry are definitely not being kept before the consumer.

It was believed by the Committee that a new film would be one of the most useful and one of the least expensive methods of putting the ice industry's best foot forward.

Iced Coffee Promotion

LAST year the Pan American Coffee Bureau sponsored the greatest iced coffee promotion in history. It was aimed at making ice coffee universally popular as a summer time cool-off drink. This year the promotion is being repeated, which provides an opportunity for a joint campaign. The coffee folks will plug iced coffee, and the ice industry will plug iced coffee. Thus, more coffee and more ice will be sold.

The Pan American Coffee Bureau is making available to ice producers, beautiful four-color iced coffee posters. These attractive, colorful posters are standard 20½ x 30½ inches. They are ideal for use on all trucks, vending stations, manually operated stations, plant platforms, poster boards, and any number of places where the public will see them.

News of PEOPLE

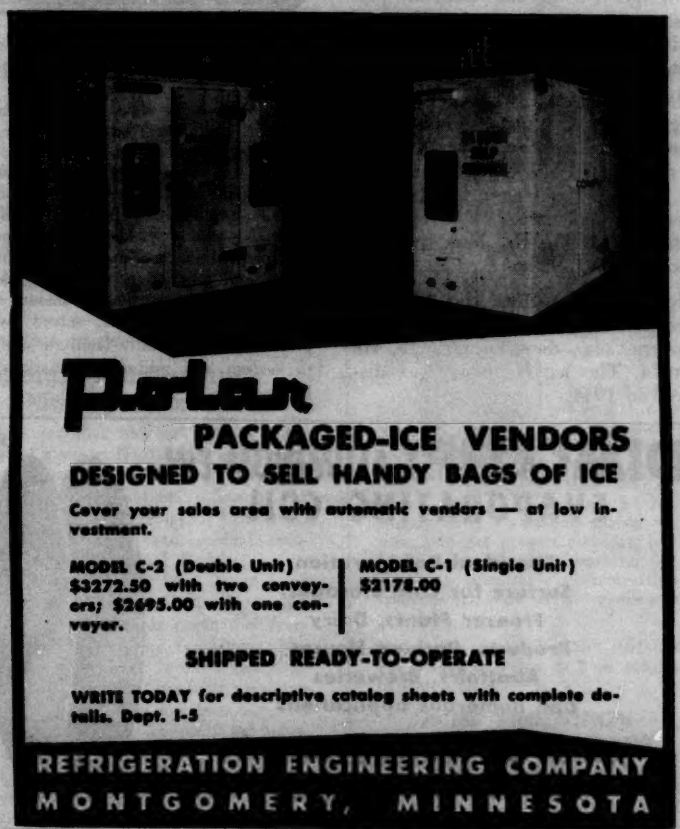
HOBART C. RAMSEY, Chairman of the Worthington Corp. Harrison, N. J. will be chairman of the Ninth Annual Business Conference of the Rutgers School of Business Administration and the Sales Executives Club of Northern, New Jersey to be held at the State University at New Brunswick, N.J., May 16. The conference will have as its theme "What is ahead for business." It has presented industry, labor, and government leaders to give their views on economic conditions since 1948.

CHESTER R. ANDERSON, who has been with the Gay Engineering Corporation for nearly a quarter of a century is now the president and general manager of this popular refrigeration engineering firm. Gay has been a Western leader in the industrial refrigeration engineering field for over forty yearse. In recent years, under the direction of Mr. Anderson, the "Gayvac" process of Vacuum Precooling was developed and it is now operating in all principal lettuce growing areas through-out California, Arizona, Colorado and Texas.

E. M. DODDS, chairman of the board of directors, United States Cold Storage Corporation will again this year direct the activities of Kansas City's American Royal Live Stock and Horse Show. Mr. Dodds was re-elected president of the American Royal Association at the first meeting of its board of directors, February 8. This successive term will be the second for Mr. Dodds, who has been identified with the American Royal in various capacities since 1926.

STERLING HALL, manager of the Manatee Ice & Storage Company, Bradenton, Fla. and Mayor of Bradenton has been elected president of the Florida League of Municipalities, composed of officials of Florida cities. Mayor Hall has served many years as a member of the association, and his election as president is richly deserved.

JAMES W. STRAUB was appointed executive vice-president and reappointed treasurer of the Merchants Refrigerating Company, New York, at a recent meeting of the board of directors.


Parlan
PACKAGED-ICE VENDORS
DESIGNED TO SELL HANDY BAGS OF ICE
Cover your sales area with automatic vendors — at low investment.
MODEL C-2 (Double Unit) $3272.50 with two conveyors; $2695.00 with one conveyor.
MODEL C-1 (Single Unit) $2178.00
SHIPPED READY-TO-OPERATE
WRITE TODAY for descriptive catalog sheets with complete details. Dept. I-5
REFRIGERATION ENGINEERING COMPANY
MONTGOMERY, MINNESOTA

DEATHS

Wetmore Hodges

WETMORE HODGES, 69, industrialist who backed the late Clarence Birdseye in launching the frozen foods industry, died at Palo Alto, Calif., April 2. Mr. Hodges was one of three men who backed Mr. Birdseye in setting up the General Seafoods Corp. in 1924 and, not long after that, the General Foods Corp. He helped Mr. Birdseye build the necessary machines and finance the operation.

Five years later, as president of the corporation, he played a major part in negotiating the sale of the two companies to the Postum Company for $22,000,000, up to then the largest sum that had ever been paid for the rights on a food-processing system. Postum subsequently adopted the name General Foods Corp.

After the sale of the company, Mr. Hodges moved from Massachusetts to Montana and there for many years operated the Jumping Horse stock ranch. Before he joined Mr. Birdseye in the frozen-foods enterprise, he had been vice-president and secretary of the American Radiator Co. in New York, a post he resigned to become associate professor of research at the Harvard University graduate school of business.

HERMAN HAGER, who operated the Hager Ice & Coal Company, at Bloomfield, N. J. for 20 years before he retired in 1949, died January 12. He was 74. Mr. Hager was born in Germany and came to the United States in 1893. He had lived in Bloomfield 49 years.

JOHN E. ARMOUR, who formerly operated of the Armor Ice Company, Denver, Colo., died January 13. He was 74. The ice company was dissolved in 1944.

Enoch Edward Irwin

THE DEATH of Enoch Edward Irwin, Columbus, Texas, occurred March 4 at the age of 68. He operated the ice business in Columbus which he entered in 1925 and expanded the business to other locations in the south central section of Texas. He was also owner of the Irwin Motor Company of Columbus. He served several terms as a member of the board of directors of the Southwestern Ice Manufacturers Association and was elected president in 1955. He was Mayor of Columbus for twelve years, and as Mayor and Civic leader for many years, he made of his home town one of the most beautiful and modern of the small cities in Texas.

MRS. JOHN C. MUCKERMAN, widow of one of the founders of the Polar Wave Ice & Fuel Company, now the City Products Corp., St. Louis, Mo., died at St. Vincent's hospital, March 5. She was 84. Her husband, a member of the board of the ice and fuel concern, died in 1951.

William James Hendron

WILLIAM JAMES HENDRON for many years the chief engineer for Booth Cold Storage Division of Booth Fisheries, Inc., passed away late in March. Hendron had recently retired, being succeeded by Arthur F. Christensen. Mr. Hendron is survived by his widow, Bertha, eight children and 15 grandchildren. He was a member of NAPRE from the early 20's, interrupting his membership in 1942. With the exception of this short lapse he approached nearly 30 years in the organization.

ARTHUR W. WILLIAMS, for many years general manager of Belle Ewart Ice & Fuel Company, Toronto, Canada, died February 8, 1957 at his home in Toronto. Mr. Williams was an active member of the Canadian Association of Ice Industries, was an active participant at conferences and committee meetings ever since the Association was formed, and was treasurer of the Association for many years. He had been retired for a few years.

MANUFACTURERS' NEWS

MMM Opens Ohio Plant

MMM, INC., of Houston, Texas, fabricators of Styrofoam low-temperature pipe covering, has opened its Portsmouth, Ohio, division in a recently acquired 60,000-square-foot plant. The Ohio plant will manufacture Vapor-Wall pipe covering and will also mold products from expanded polystyrene beads. Edward Baker, a director and production manager of MMM, Inc., is in charge of the Portsmouth operation. The new location, served by rail and truck, will greatly facilitate deliveries to eastern and midwestern markets, Mr. Baker said

Worthington Opens New Sales Unit

A NEW internal sales organization has been established by the Worthington Corp. to handle its air conditioning and refrigeration business through franchised outlets, M. M. Lawler, vice-president, announced. Seven district offices head-quartered in Los Angeles, Houston, Chicago, Atlanta, Philadelphia, Cleveland and New York will be manned by a complete field sales force. These staffs will be in charge of franchised outlet business exclusively and operate apart from the present Worthington district sales office network.

DIMCO CAST ALUMINUM FIN EVAPORATING COIL

The Ideal Refrigeration Surface for Cold Storages, Freezer Plants, Dairy Products, Packing Houses, Abattoirs, Breweries and numerous applications

DETROIT ICE MACHINE COMPANY

2615 Twelfth St., Detroit 16, Mich.

★ *Saves Space*

★ *Saves Weight*

★ *Saves Cost*

CAN BE USED WITH ANY REFRIGERANT

Write For Descriptive Folder

Gerrard New St. Louis Manager for York

J. W. Gerrard

J. W. GERRARD has been appointed St. Louis branch manager, it has been announced by R. E. Cassatt, manager, sales, of the Commercial Division of York Corporation, Subsidiary of Borg-Warner Corporation. Mr. Gerrard has been with the Pennsylvania manufacturer of air conditioning, refrigerating, and ice making equipment for more than 25 years. He was treasurer of the Boston branch for about 10 years prior to being transferred to the home office in 1943, where he served successively as field auditor, as supervisor of distributor methods, and as sales administrator, room air conditioners.

The St. Louis branch functions as a wholesale distributor of York residential and commercial air conditioners, room air conditioners, and ice service and refrigeration equipment under the Midwest district office. It is located in the York Corporation building at 121 South 11th Street, which also houses the Midwest District offices of both the commercial and 15 to shareholders of record February 12. industrial divisions.

Armstrong Changes

L. E. COVER, manager of Equipment Insulation Sales of the Insulation Division, Armstrong Cork Company, retired April 1 after 41 years service with the Company, H. R. Peck, Vice-President in charge of Building Materials Operations, announced. Cover, will be succeeded by R. L. Collister, assistant manager of Equipment Insulation Sales. Mr. Cover joined the Armstrong Cork Company in Pittsburgh in 1916.

L. E. Cover

R. L. Collister

Mr. Collister is a native of Cleveland, Ohio, and a 1948 aeronautics engineering graduate of Purdue University. Before completing his studies at Purdue, he served 42 months in the army field artillery. He was discharged with the rank of captain in 1946. Since joining the company in 1948, Collister has served in Insulation Division sales offices in Cincinnati, Indianapolis and Chicago. He returned to the general office in Lancaster in 1954 to serve as administrative assistant in Equipment Insulation Sales. He was named assistant manager in 1954 and has served in that capacity since that time.

Carter New Manager of Frick St. Louis Office

John H. Carter

JOHN H. CARTER, on March 1 became manager of the St. Louis branch office of Frick Company, Waynesboro, Pa. Mr. Carter is a member and former president (1947-48) of the St. Louis Chapter of ASHAE, and has also been active in the Joint Council of the Associated Engineering Societies of St. Louis, and the Missouri and National Societies of Professional Engineers. He has been a member of the St. Louis Engineer's Club since 1946, and is a member of the Webster Groves City Council, also a member of Naval Reserve Research Company 9-8, of which he was Commanding Officer from 1951 to 1956.

Mr. Carter was with Frick Company and later with their St. Louis Distributor, Kremer-Hicks Co., from 1934 until he entered the Navy in 1942. Since 1945 he has been a consulting engineer specializing in refrigeration and air conditioning, and has also been a project engineer with Severdrup & Parcel, Inc.

DuPont Changes to "Freon" Produce Division

THE DuPont Organic Chemicals Department concerned with manufacture and sales of fluorinated hydrocarbon refrigerants, aerosol, propellents, solvents, and fire extinguishing agents has been changed to the "Freon" Products Division. The change drops the DuPont designation of "Kinetic" Chemicals Division, under which the "Freon" compounds have been made since DuPont acquired assets of "Kinetic" Chemicals, Inc.

As a registered trademark of the DuPont Company the term "Freon" is used generally to describe its fluorinated hydrocarbon refrigerants, aerosol propellents, solvents and fire extinguishing agents. Other registered forms of the trademark incorporate numerals or letters to describe individual compounds, such as "Freon-12" dichlorodifluoromethane.

Clippinger Maintenance Sales Manager For York

J. V. CLIPPINGER has been named manager of Accessory Equipment and Maintenance Sales for the Industrial Division of the York Corporation, subsidiary of Borg-Warner, it was announced by Ray K. Serfass, vice-president and general manager of York's Industrial Division.

Mr. Clippinger had been serving as Supervisor of A. E. & M. product sales since 1954. Following his graduation from the Carnegie Institute of Technology, Mr. Clippinger joined York in 1937 and completed York's college graduate training course a year later. He was then assigned as a sales and service engineer on industrial air conditioning and refrigeration installations until 1950, when he joined the accessory equipment and maintenance department.

OPERATION BREWERY

SALVAGE

No Reasonable Offer Refused

Sacrifice 2 York 10 x 10 Twin Ammonia Compressors, AC.

1 York 250 HP 4 cyl.—132.5 tons—Large type Ammonia Compressors 360 R.P.M.—Direct Connections. Had only 3 years service—Unusual.

1 York 10 x 10 Am. Comp. 125 HP. Sync. Motor—Cap. 67.2 tons-AC.

1 Vertical Skinner Uniflow Engine—Excellent Machine.

Generators — Ammonia and Brine Pumps — Piping — Room blowers — Cold storage doors.

Complete Giant Brewery Dismantling

Inquire for Equipment Not Listed

SEABOARD METAL & SALVAGE CORP.

186 Third Street, Brooklyn, N. Y.

See Carl Fraides on the spot

Tel. MAIN 4-5860

SPECIFY **ACME**

. . . The Gas Mask that Gives You MAXIMUM USABLE VISION

Tests prove that ACME gas masks lead the field in giving you clear, undistorted vision —up, down, and to either side. Along with maximum usable vision, you get greater comfort, less fogging, minimum breathing resistance, acceptable conversation transmission—all at down-to-earth prices.

Write for Bulletins No. 501 on gas masks and No. 562 on results of vision tests.

ACME PROTECTION EQUIPMENT COMPANY

1211 Kalamazoo St., South Haven, Michigan

NOYO

Shredded

REDWOOD BARK INSULATION

●

UNION LUMBER COMPANY

620 Market St.,
San Francisco

Los Angeles
Park Ridge, Ill.
New York

CATALOGS AND BULLETINS

New Caterpillar Booklet

THE incorporation of a production diesel engine into the crawler tractor and many other notable "firsts" are described in a new booklet, "A Quarter Century of Diesel Leadership," released by Caterpillar Tractor Co. The booklet tells the story of the Company's many engineering achievements since Caterpillar's entrance into the diesel engine field in 1931. Among the important accomplishments discussed is the Caterpillar fuel injection system, the development of detergent oils, the induction hardening of cylinder liners and camshafts, the use of aluminum alloy main and connecting rod bearings and other precedent-setting developments.

Illustrated with both photographs and drawings, the booklet depicts installations where early model Caterpillar Diesel Engines are still on the job. Each illustration is accompanied by information describing the engine's application and history. Also shown is the Company's current line of diesel engines represented in various power arrangements — industrial power units, self-regulated electric sets, spark-ignition engines designed to burn natural gas as fuel, torque converter units, twin arc-welders and marine diesel engines.

Clark Door Catalogs

TWO new catalogs describing its line of automatic door equipment have been released by The Clark Door Company, Newark, N.J. One of these refers to the Prest-O-Matic Electric Industrial Door Units and Fire Door Operators. Consisting of eight pages, the booklet describes the various models available and includes illustrations, drawings, and suggested specifications. The second catalog, consisting of four pages, refers to Prest-O-Matic Cold Storage Door assemblies, and also contains photographs, drawings, and suggested specifications.

Spraying Systems Bulletin

THE proper selecting and obtaining of all components required in an industrial humidifying system sometimes offers a problem. To simplify this buying problem, Spraying Systems, Bellwood, Ill., now offers all units required in a system,

ALWAYS DEPENDABLE

B·P NATIONAL

ANHYDROUS AMMONIA

Sign of Dependability Since 1890

FAST DELIVERY FROM YOUR NEARBY DISTRIBUTOR

Chicago, Illinois	The Creamery Package Mfg. Co.
Cincinnati, Ohio	John H. Schafer, Inc.
Corpus Christi, Texas	Barada & Page, Inc.
Dallas, Texas	Barada & Page, Inc.
Denver, Colorado	The Chemical Sales Co.
Detroit, Michigan	Davis Supply Co.
Flint, Michigan	Davis Supply Co.
Fort Worth, Texas	Barada & Page, Inc.
Houston, Texas	Barada & Page, Inc.
Indianapolis, Indiana	Wm. Lynn Chemical Co., Inc.
Kansas City, Missouri	Barada & Page, Inc.
Kansas City, Missouri	The Creamery Package Mfg. Co.
Louisville, Kentucky	Merchants Chemical Co., Inc.
Memphis, Tennessee	Bessire & Company, Inc.
Milwaukee, Wisconsin	Reichel-Korfmann Company
Minneapolis, Minnesota	The Creamery Package Mfg. Co.
Nashville, Tennessee	John Bouchard & Sons Co., Inc.
New Orleans, Louisiana	Barada & Page, Inc.
New Orleans, Louisiana	Whitman-Holloway-Olivier
Odessa, Texas	Barada & Page, Inc.
Oklahoma City, Oklahoma	Barada & Page, Inc.
Omaha, Nebraska	Kennedy & Parsons Co.
St. Louis, Missouri	Barada & Page, Inc.
Sioux City, Iowa	Kennedy & Parsons Co.
Tulsa, Oklahoma	Barada & Page, Inc.
Waterloo, Iowa	The Creamery Package Mfg. Co.
Wichita, Kansas	Barada & Page, Inc.

other than the piping and wiring. The new Bulletin 82 illustrates and describes nozzles, nozzle assemblies, float boxes, humidistats, solenoid operated valves, and all other required components. Included is information on Spraying Systems' compact humidifying units for easy installation in smaller plant rooms. In addition to humidifying equipment, this new bulletin also describes nozzles for such installations as air washers and cooling towers.

Brochures on Ice Vending

DESCRIPTIVE catalog sheets on their complete line of ice vending equipment has been issued by the Refrigerating Engineering Company, Montgomery, Minn. These brochures outline in detail the construction features of the products and illustrate various types of installations. Included in the Polar line are three distinct types of vendors, all emphasizing beauty and appearance.

Polar Style-Line Stations, shipped ready-to-operate, sell both bags and cakes of ice. They are manufactured in 14 different sizes, and are available with vendors in all combinations. Polar Packaged-Ice Vendors are designed to sell handy bags of ice. Also shipped ready-to-operate, they are available in single and double models, the C-1 and C-2. Polar Custom-Line Stations are manufactured in sections according to the same specifications and techniques as their well-known freezers and coolers. These stations, shipped in sections, are assembled on site. They are available in any size, with or without automatic conveyors. Sizing and bagging operations can be handled within the station.

Article Describes Multi Stage Refrigeration

A TWO-PAGE article describing multi-stage refrigeration at an ice cream plant is now available from Freezing Equipment Sales, Inc., York, Pa. The article explains the problems posed when Superior Dairy, Canton, Ohio, outgrew its refrigeration facilities. The solutions and the benefits derived from the installation of a multi-stage refrigeration system are further detailed in the article. Two photographs and a diagram of a multi-stage refrigeration system using a rotary compressor illustrate the article.

Bulletin on Pump Features

A NEW four-page bulletin for those interested in modern large scale hot water heating and chilled water cooling systems has been released by Bell & Gossett, Morton Grove, Illinois. Easy to read, this bulletin lists important B & G Base Mounted Universal Pump features and gives a typical specification form that shows how these pumps meet today's exacting demands in this field. A large cutaway diagram plus detailed capacity and size information makes this a useful adjunct to working data files.

YORK ECONOMIZERS COMPRESSORS

7 York EV 10A Evaporative condensers — New 1950 — 10 HP Magnetic starters 220/3/60.

3 York room blower — Refrigeration units.

Blue prints and complete information available.

Generators —

Turbines —

Transformers

Late type refrigeration doors — thousands feet, ammonia galvanized pipe, coils and valves (some new) — Tanks —

Hose —

Conveyors —

Pumps

Babcock and Wilcox — FF Intergal type Boilers — New 1950 — 260 HP 450 lbs. pressure — Like New.

HARVARD BREWERY PLANT LIQUIDATION

P. O. Box 565 Lowell, Mass.

Phone Glenview 4-7703

Classified Advertising

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: 20c per word; minimum 25 words. $2.00 per line for bold face headings; $15.00 per inch for line listings.

USED EQUIPMENT—wanted & for sale

FOR SALE — Refrigeration equipment; ice equipment; new, used. Advise us your needs. Use "QUICKSEAL" — stops brine tank leaks; easy, efficient, economical. Born Company, 80 East Jackson Boulevard, Chicago 4, Illinois. WAbash 2-3299

FOR SALE—Ice Crane. Three motor—3 BDS double girder ice crane floor operated. Span 25' 11", capacity 1½ tons. Bridge construction: 2-12" I beams. Bridge travel: 3½h.p. V/S motor mounted in center of crane; trolley: 1½ h.p. variable speed control. Hoist: 2-A type "H" A.C. hoist with single speed control 8' lift. 2 strands ⅜" cable used. Current: 440-3-60, serial No. 6811E. Detroit Hoist & Machine Co. Write The Terminal Cold Storage & Ice Co., 20-60 Esker St., P.O. Box 156, Dayton 1, Ohio.

WANTED TO BUY—1 ice crusher and blower 50 to 100 lb. capacity, with motor and hose; must be in working condition and reasonable. Culpepper Ice & Canning Co., Culpeper, Va.

FOR SALE—4x4, 5x5, 8x8 Yorks, 5x5 Frick. 20" ammonia receiver, reconditioned. Valves up to 4", 40% off. Write E. Niebling, 1546 St. Clair Ave., Mt. Healthy, Cincinnati 31, Ohio.

FOR SALE—Used Frick ammonia compressor, 7½"x7½", complete with 40 h.p. motor and drive package, excellent condition; water cooled condenser, 10'x16", excellent condition, new tubes recently installed. Owner closing down ice mfg. plant; now available, will sell cheap. Write Box No. MY-3, c/o Industrial Refrigeration.

NOTE—If you want increased performance from your compressor, old or new, don't miss the Ball Valve ad on page 56 of this magazine.

FOR SALE—3000' steel tubing 1½" in coil banks approximately 18' long. Good 5 x 5 Lipmon, 5 x 5 York with broken shaft. Reasonable. Harp's Green Valley Farms, Inc. 309 N. Oklahoma, Shawnee, Okla.

FOR SALE

4—10"x10" 4-cyl. York duplex D.C. to 225 h.p. motor.
2—10"x10" 2-cyl. Frick D.C. to 100 h.p. motor.
2—10"x10" 2-cyl. York D.C. to 100 h.p. motor.
3—9"x9"2-cyl. York D.C. to 75 h.p. motor.
1—7¼"x5" Frick booster.
2—7¼"x7½" 2-cyl. York compressors.
1—6"x6" Frick 2-cyl. compressor.
1—5"x5" York 2-cyl. compressor.
1—3"x3", 1—4"x4", 1—5"x5" condensing units
11"x22"x47" — 11"x22"x51" ice cans.
20—100-ton ice plants, York and Frick.
1—3¼"x3" 8-cyl. V/W York belt driven ammonia compressor.
1—3½"x4¼" 6-cyl. V/W York ammonia booster compressor.
1—6½"x5" 6-cyl. V/W York booster ammonia compressor.
1—25-ton Chrysler Air tem. Freon condensing unit, complete.
1—40-ton General Electric Freon condensing unit, complete.
1—50-ton General Electric Freon condensing unit, complete.
1—50 ton Buffalo Freon evaporative condenser.

ENTERPRISE EQUIPMENT CORPORATION
79 Alexander St., Yonkers, N. Y., Box 502
Cable: ENEQCO — Phone Yonkers 8-8118-9

USED EQUIPMENT—continued

FOR SALE

Synchronous Motors, NEW engine-type, 440 volt with EM line starters,
125 hp EM 277 r.p.m. 80% PF
150 hp F-M 327 r.p.m. unity PF.
49- new 5 can baskets for 11"x22" cans.
Air agitation equip. for 384 cans.
1-ton Vilter Pakicer new, 1 ton bin, 3 hp condensing unit.
Misc. new and used refrigeration equipment.

RALPH E. MANNS CO.
1030 E. Anaheim St. Wilmington, Calif.

WANTED—Large International lime and soda ash water softener, continuous type. Give condition, age, size and price. Wood or steel tank. Abso-Pure Ice and Coal Co., 138 East 8th St., Peru, Indiana.

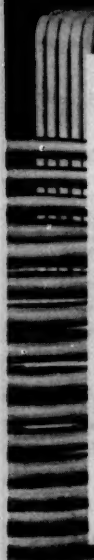
FOR SALE

10x10 York compressor w/V-belt drive.
10x7½ York & 8x6 York Model D-8 boosters.
7½x7½ York w/V-belt drive to 50 h.p. motor.
4x4 York self contained unit.
2—6'x16" coded receivers w/valves.
2—cooling towers 1000 GPM & 500 GPM.
3—7'6" x 5'6" freezer doors.
2—3¾ ton Shepard 3 motor cranes.
11x22x51/52" ice cans in grids of 15.
Condensers, receivers, motors, etc.

JOHN F. CARSON
A & Venango Sts. Philadelphia 34, Pa.
GArfield 6-2221

QUICK RESULTS with Classified Ads

PIPE BENDING EXPERTS



Coils, Headers, Fabrications

Completely modern metalworking machines, plus over 36 years of "know-how", assure the finest work to your exact specifications. Proven specialists in custom bending in any form, any metal, even stainless steel.

May we quote on your next job?

CHICAGO NIPPLE
MANUFACTURING CO.
1997 CLYBOURN · CHICAGO 14

complete refrigeration engineering service

Specialists in —

- Warehouses — Refrigeration and Insulation
- Food-Freezing
- Low Temperature Refrigeration
- Design of
  Non-Frost Heaving Floors
  Frost-Free Vestibules

Backed by a quarter-century of national and international experience, V. C. Patterson & Associates staff of specialized engineers is available to aid you with your refrigeration, insulation, food-freezing, warehousing, and allied problems. For new construction or for renovating present facilities, you'll find our engineered plans will mean greater efficiency and real money-saving operations. What's your problem? Write us.

V. C. PATTERSON & ASSOCIATES, INC.
415 West Market Street - York, Pa.
(Phone 82-058)

Little Giant Model 90M

11 MODELS IN THIS LINE OF ICE BREAKERS FOR:

RESTAURANTS • HOTELS • AIR LINES
RAILROADS • LABORATORIES • TAVERNS
ICE PRODUCERS • PACKING HOUSES

The Little Giant Line has a long record of service to many types of users. These breakers are designed to break ice in rice to chestnut to 3" size and pea to chestnut to 4½" size. Hand and power operated. Write for details and prices.

LITTLE GIANT

DEPENDABLE ICE BREAKERS BY
MICRON, INC., BETTENDORF, IOWA

FRED OPHULS & ASSOCIATES

Consulting Engineers

112-114 West 42nd St. New York City 36

Industrial Power Plants
Refrigeration and
Cold Storage Warehouses,
Reports, Appraisals and Management

VAN RENSSELAER H. GREENE

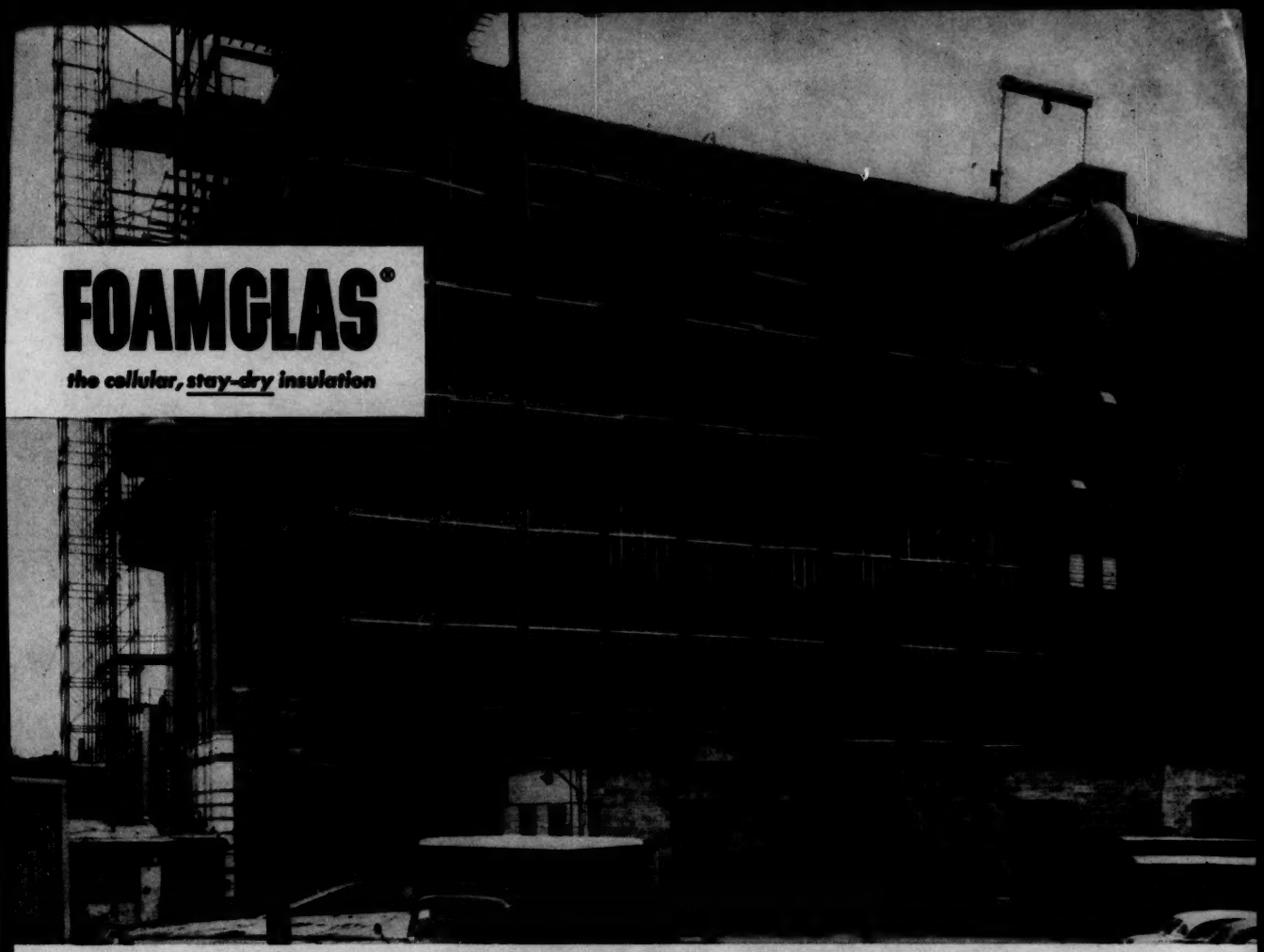
ENGINEERS

COMPLETE PLANT DESIGNS INCLUDING BUILDING AND EQUIPMENT

11 PARK PLACE NEW YORK 7, N. Y.

ADVERTISERS

Acme Protection Equipment Co. 61
Alco Valve Co. ..... Outside Back Cover
Allied Chemical & Dye Corp., General Chemical Div. 6
Allin Mfg. Co. 49
American Hair & Felt Co. 55
Armour & Co. 29
Armstrong Cork Co. 2
Ball Valve Co. 56
Barada and Page, Inc. 62
Brown Mfg. Co., Inc., K. G. 53
Butcher Boy Refrigeration Door Co. 1
Carrier Corp. 36
Caterpillar Tractor Co. 10
Chemical Solvent Co. 58
Chicago Nipple Mfg. Co. 64
Classified Advertising 63
Creamery Package Mfg. Co., The 9
Dorsch, Gesswein & Neuert, Inc. 43
Detroit Ice Machine Co. 60
Dole Refrigerating Co. 8
Dow Chemical Co., The ..... 44 and 45
Frick Co. 57
General Chemical Div., Allied Chemical & Dye Corp. 6
Greene, Van R. H. 64
Harvard Brewing Co. 63
Howe Ice Machine Co. 54
King Co. of Owatonna, The 51
Kramer Trenton Co. 50
Link-Belt Co. 47
Marley Co., The 41
Micron, Inc. 64
National Pipe Bending Co. 57
Ohio Galvanizing Co. 54
Ophuls & Associates, Fred 64
Owens-Corning Fiberglas Corp. 12
Patterson & Assoc. Inc., V. C. 64
Perfection Ice Scoring Machine Co., The 51
Pittsburgh-Corning Corp. Inside Back Cover
Refrigeration Engineering Co. 59
S & S Vending Machine Co. 49
Seaboard Metal & Salvage Co. 61
Swift & Co., Adhesive Products Dept. 52
Taylor Instrument Companies 5
Texas Co. ..... Inside Front Cover
Union Lumber Co. 62
United Cork Co. 27
Vilter Mfg. Co. 39
Wanted and For Sale Advertising 63
Watkins Co., J. E. 53
York Corp. ..... 32 and 33



Huge fermenting tank moves through open wall area of Stroh stockhouse. Note strong, moisture-proof FOAMGLAS in place in some wall areas . . . where it stood exposed to the weather for weeks. Engineers: Harley, Ellington & Day, Inc., Detroit.

On the strength of FOAMGLAS . . . Stroh Brewery got 30 days extra production

Rapid sales growth at The Stroh Brewery Company, Detroit, has required building two new stockhouses since 1953. Each went into production 30 days sooner because it was insulated with extra-strong FOAMGLAS. Here's why:

Stroh stockhouses consist of a number of double-floor and single-floor units . . . each surrounded by an envelope of FOAMGLAS. While other construction was being completed, a wall was left open. Fermenting and aging tanks and other equipment were moved through it.

FOAMGLAS was then installed, free-standing, in the building frame . . . and was left fully exposed to the weather for weeks. Stroh was able to finish interior construction and start operations some 30 days sooner because FOAMGLAS doubled as insulation *and* wall until the exterior masonry was finished. This was possible because FOAMGLAS is rigid and 3 times stronger than the next strongest insulation. Weather cannot harm it because its all-glass, sealed cell structure is waterproof.

FOAMGLAS gave Stroh other benefits, too. Its sealed glass cell structure makes FOAMGLAS its own natural vapor barrier. And, being inorganic, it can't shrink, swell or warp guaranteeing Stroh vapor-tight joints. Moreover, it *stays dry* for constant, long-lasting insulating efficiency . . . is vermin-proof and incombustible. These benefits can be *yours, too*. Prove it with six simple tests you can perform in your own office. Write today for a free sample and testing directions. Address . . .

Pittsburgh Corning Corporation
Department T-57, One Gateway Center
Pittsburgh 22, Pennsylvania
In Canada: 57 Bloor St. W., Toronto, Ontario

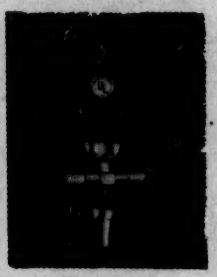
Also manufacturers of PC Glass Blocks

Workman is shown installing 6" multilayer FOAMGLAS wall insulation within Stroh stockhouse framing. 8" layer of insulation was applied on roof, 4" on basement floor and 3" on intermediate floors. Stroh also relies on moisture-proof FOAMGLAS for lasting insulating value in such other tough brewery uses as CO_2 storage areas, government cellar, low temperature piping, etc.

Type S120

Type S220

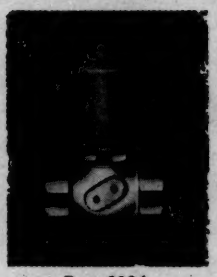
Type M340



Type M635

Type R1

Types R6 and R2



Type S804

Type S101

Type M9115

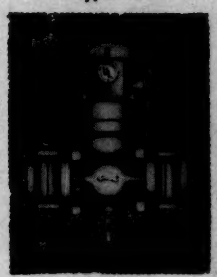
Type M8

Type DS222B

Types 905-13 and 14

Type S608-1

Type M3X

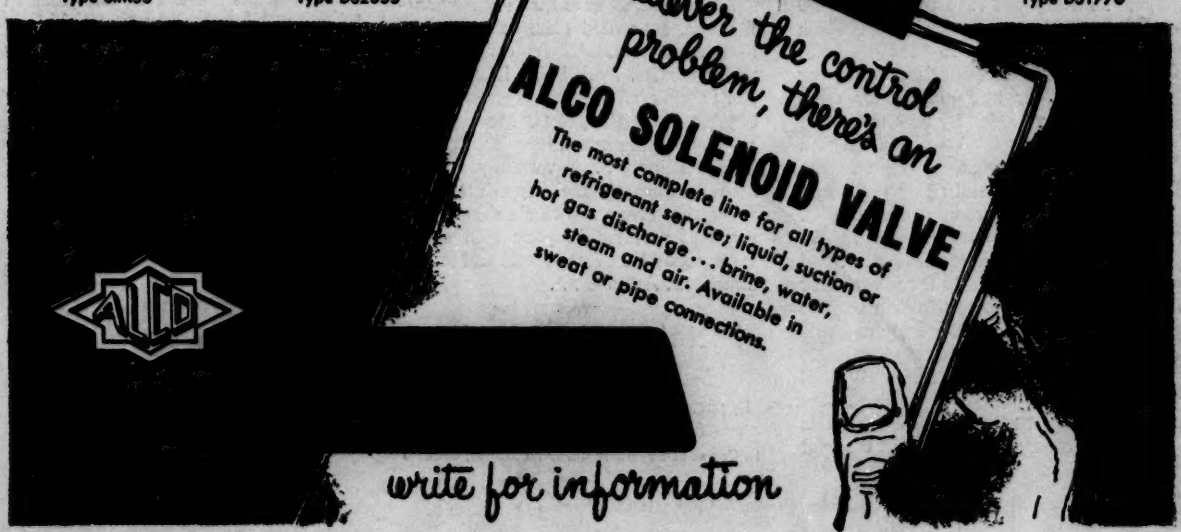


Type R2X

Type SIM55

Type DS2355

Type DS1770


whatever the control problem, there's an
ALCO SOLENOID VALVE
The most complete line for all types of refrigerant service; liquid, suction or hot gas discharge . . . brine, water, steam and air. Available in sweat or pipe connections.
write for information